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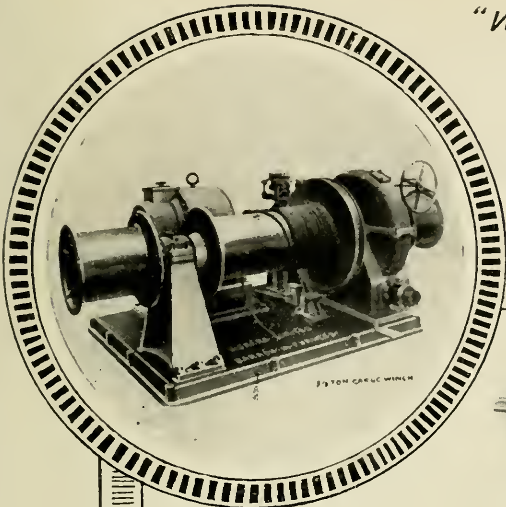

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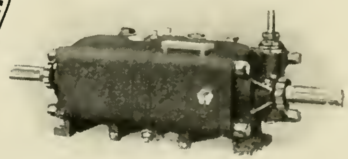

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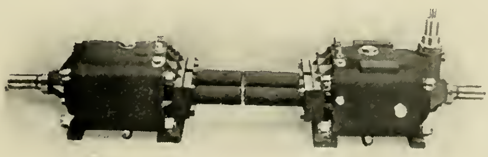

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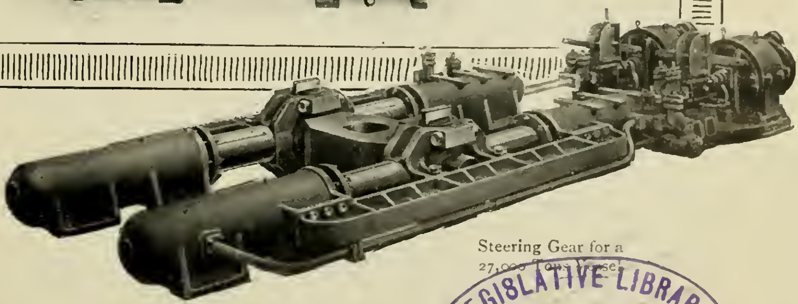

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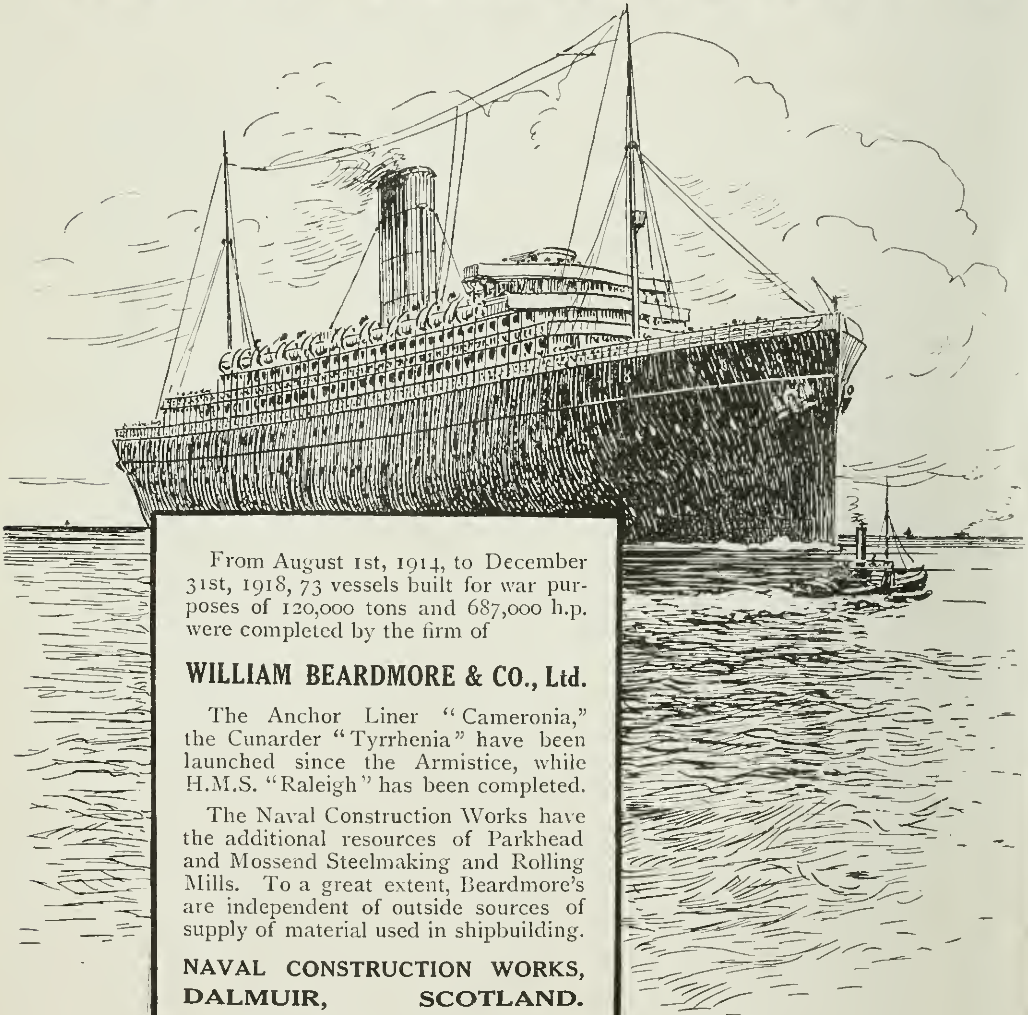

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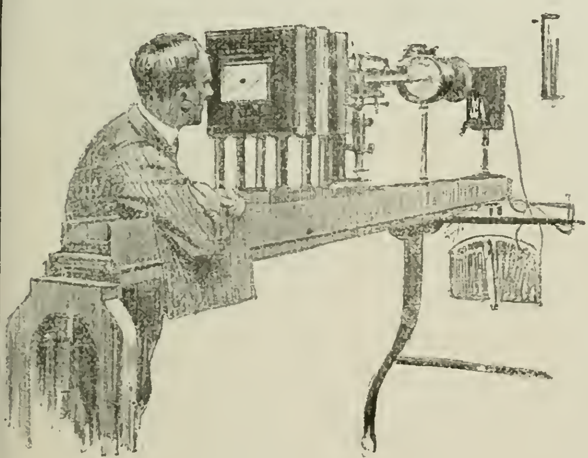

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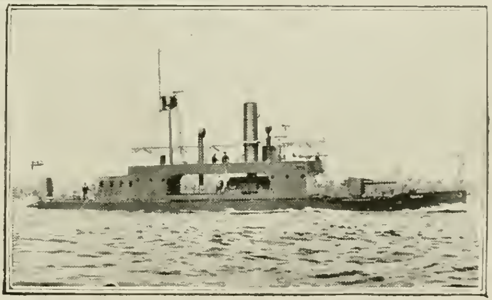

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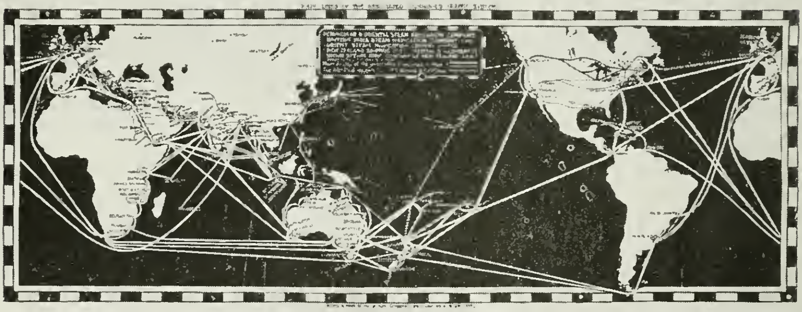

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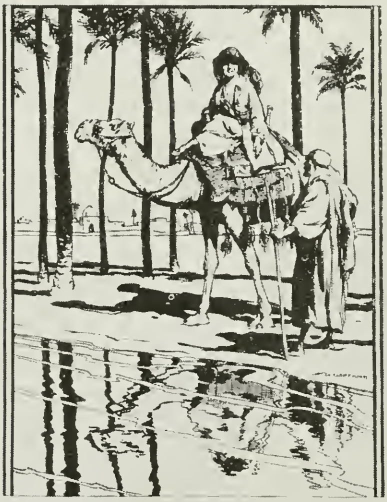

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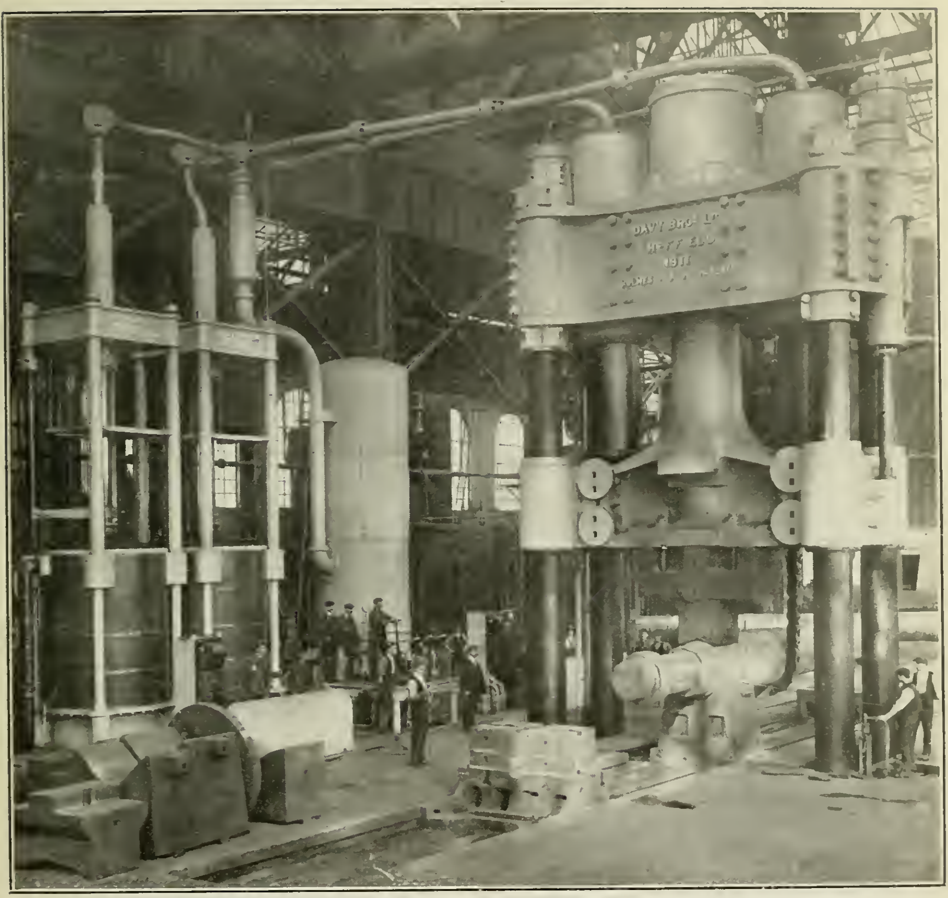

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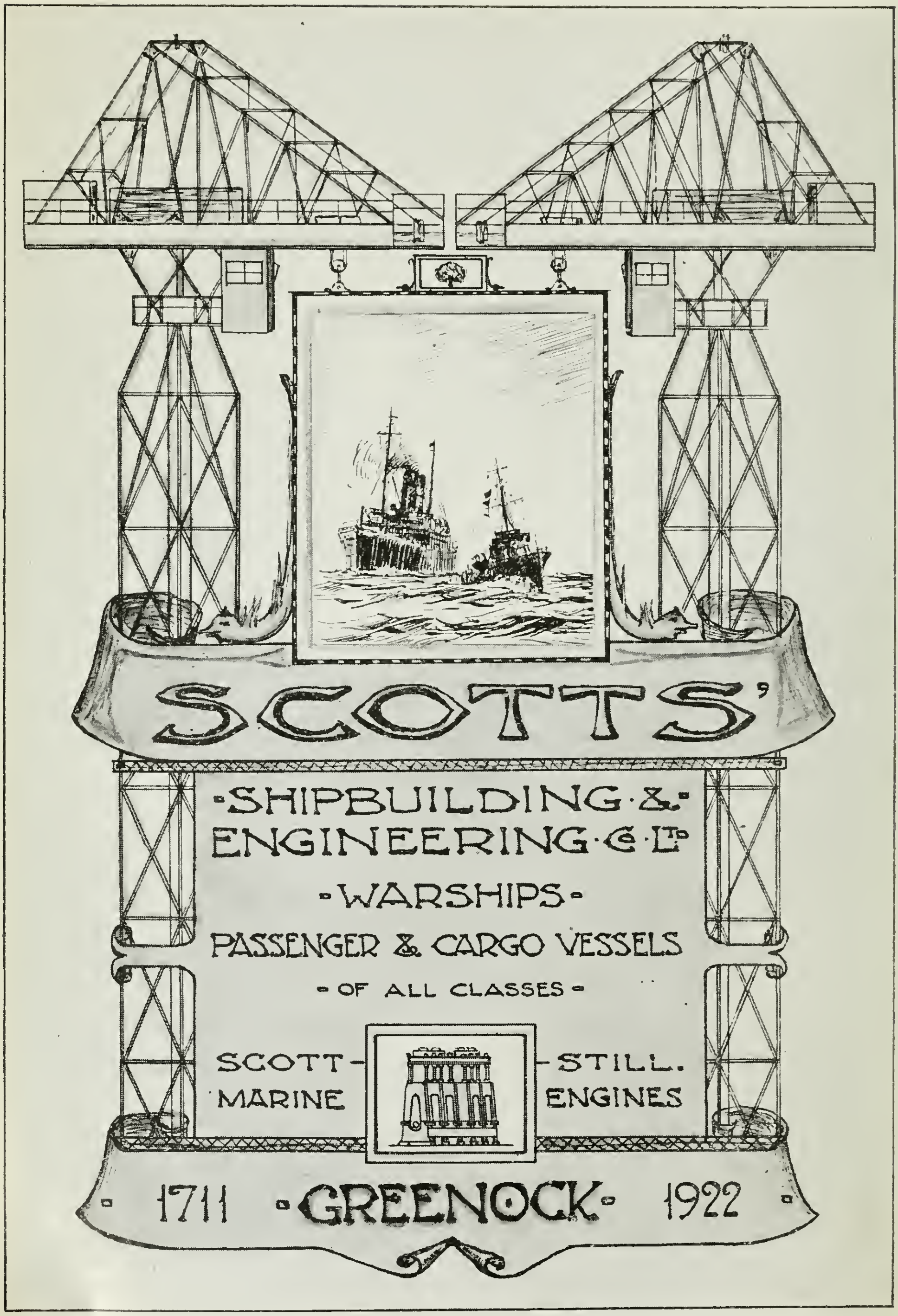
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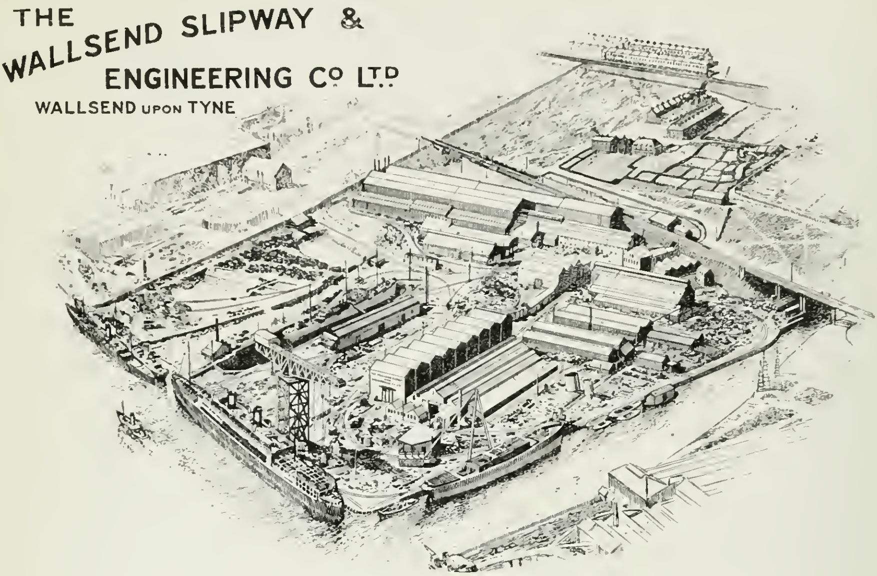

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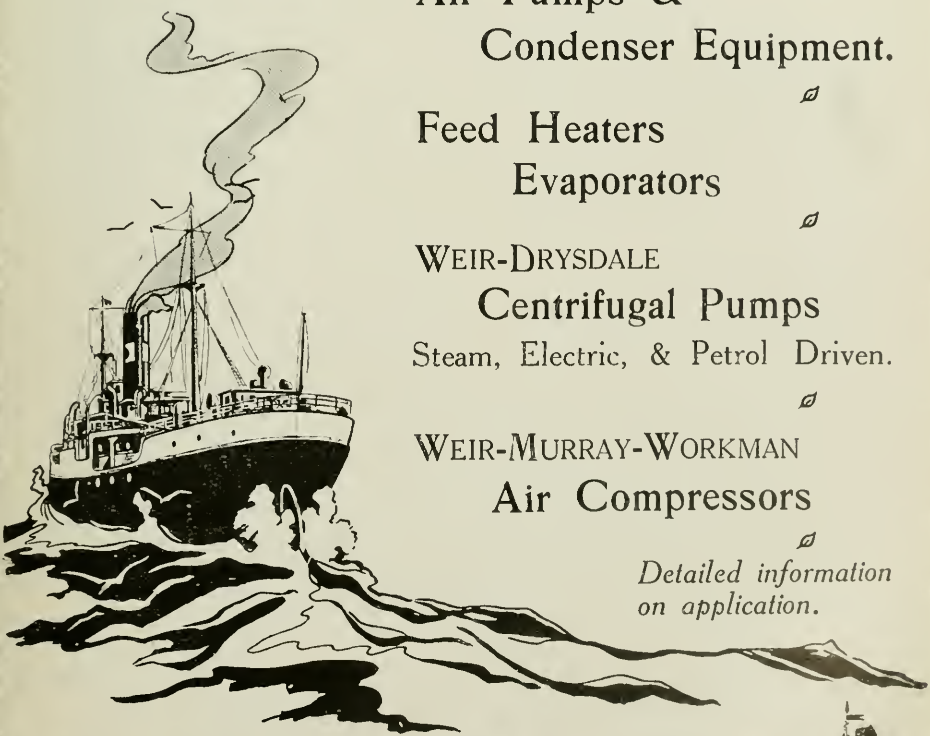

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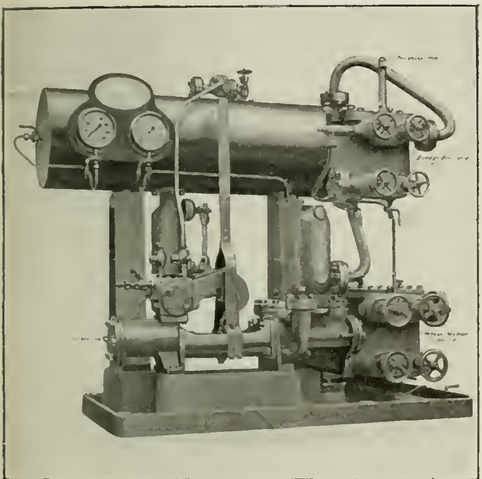

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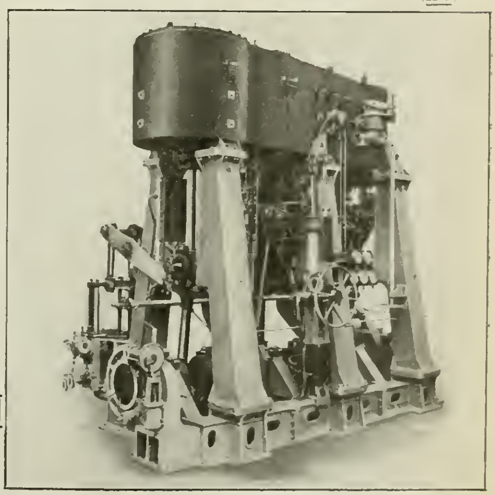

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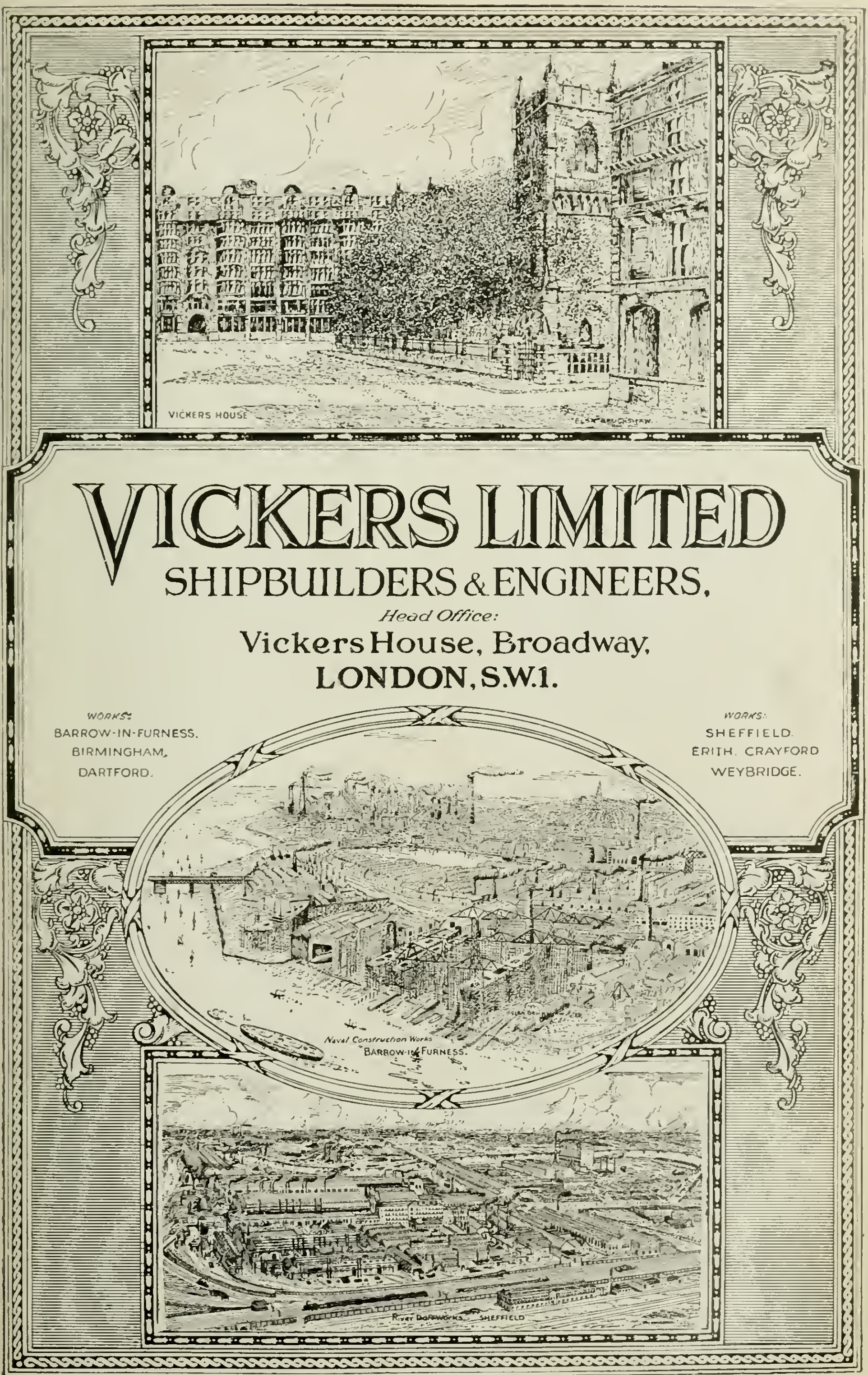
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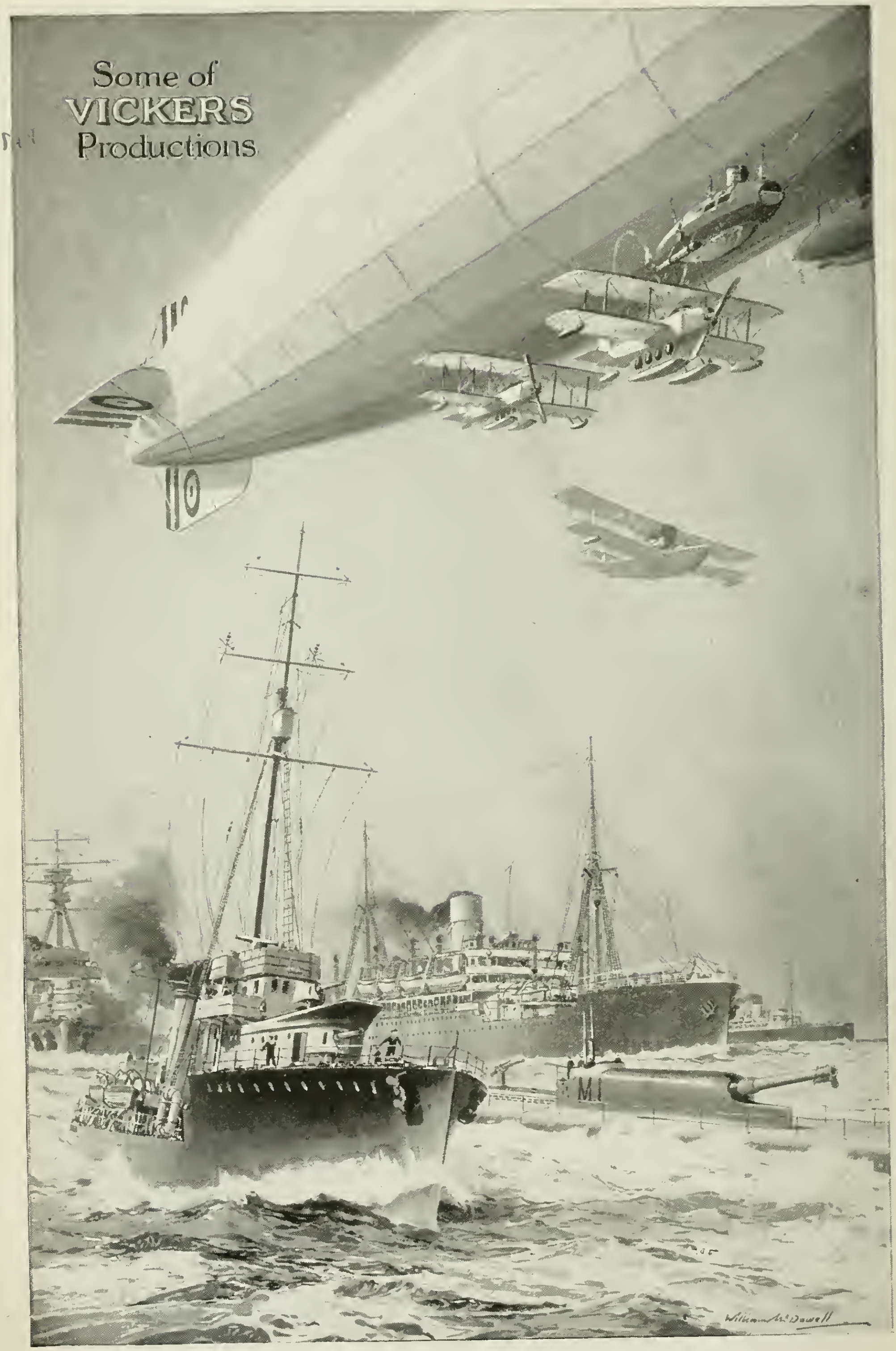
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EDITED BY

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CONTENTS.

NAVAL SECTION.

MERCHANT SHIPPING SECTION.

APPENDIX TO NAVAL SECTION.

PROFILES OF BRITISH AND FOREIGN WARSHIPS AND MERCHANT SHIPS.

APPENDIX TO MERCHANT SHIPPING SECTION.

LIST OF ILLUSTRATIONS.

PLANS OF BRITISH AND FOREIGN WARSHIPS.

Between pages 370 and 371.

PROFILES OF BRITISH AND FOREIGN WARSHIPS AND MERCHANT SHIPS.

DIAGRAMS.

PREFACE.

The present issue of "Brassey's Naval and Shipping Annual," the third in its improved and enlarged form, approaches more closely to the ideal that it should be not only the forum where all matters of naval and shipping policy are discussed authoritatively, but that it should also be an indispensable reference book for all concerned with the progress and evolution of the navies and mercantile marines of the world. It is the only publication of its kind in the English-speaking world, and the appreciation of the efforts to render it not unworthy of the great services which it is its purpose to promote, has encouraged us still further to extend its scope and, as is hoped, increase its usefulness.

The most notable development is, perhaps, the new section devoted to profiles of the principal men-of-war of all classes in the world's fleets, and of representative merchant vessels. These profiles have been introduced in the confident expectation that they will render the volume of greater interest to all who travel by sea, as well as to others. It often happens that a vessel is seen hull down on the horizon, and as she approaches curiosity is aroused as to her identity. Speculation is excited and guesses are made as to her name. She appears at a distance silhouetted against the skyline, and with the assistance of the profiles contained in this volume it is hoped that identification will be rendered easy. In subsequent issues of the "Annual," it is intended to extend still further this section, which is in charge of the well-known marine artist, Mr. A. J. W. Burgess, R.I., R.O.I.

In accordance with our conception of what "Brassey's Naval and Shipping Annual" should become, the present issue consists of a Naval Section and a Merchant Shipping Section, together with statistical and other appendices, which occupy many pages at the end of the volume. Illustrations of the newest men-of-war to be fitted out for sea, and of the latest merchant ships to be launched form a distinctive feature of this issue.

Naval policy throughout the world has been radically affected by the Washington Conference and the naval and other Treaties

which were signed by the representatives of Great Britain and the British Dominions, the United States, France, Italy, and Japan. These Treaties are printed in full as an appendix. The schedules accompanying the principal agreement indicate the capital ships which are to be scrapped by each of the signatory Powers, and the vessels which will be maintained, as well as the programmes of future shipbuilding. In view of the discussion on the use of submarines in war which took place at the Washington Conference, the precise terms of the declaration as to the limits for their employment against merchant shipping assume an importance which has not apparently been fully realised. The terms of the declaration of the five Powers are set forth.

Admiral of the Fleet Sir F. C. Doveton Sturdee has written an appreciation of the work of the Washington Conference as it affects naval policy. As the Chief of the War Staff at the Admiralty in the opening days of the Great War, and as the commander of the force which defeated the Germans at the Falkland Islands, Sir Doveton Sturdee is peculiarly fitted by his training as a Staff Officer and his long experience at sea to write on the achievements of the Conference and their influence on naval policy.

A complementary article by Sir George Thurston deals with the effects of the Washington Naval Treaty upon naval design. In the past this distinguished naval architect has exhibited much originality and courage in interpreting the requirements of the naval officer, and his remarks upon what may be described as the "Washington battleship," and the "Washington cruiser," will, it is anticipated, arouse widespread interest. For the first time since the Washington Conference closed, an attempt has been made to indicate the character and powers of the capital ships and light cruisers which can be built under the terms of the Naval Treaty. Sir George Thurston also refers to the possible lines of development of the aircraft carrier.

It has been apparent to all informed observers of the course of events at the Washington Conference that the agreement for the limitation of naval armaments is destined to have an important influence on the various industries which have hitherto been concerned with the production of naval war material in this country. A new problem has been raised to which it has been thought not inappropriate to direct attention. After the two capital ships to be laid down immediately have been completed, no further vessels of the type can be begun in this country until 1931 in anticipation of the replacement of the Iron Duke, the Marlborough, the Emperor of India, and the Benbow. Any naval construction must be confined to light cruisers, destroyers and submarines. In these circumstances, what is to happen to the varied and costly

equipment devoted to the production of heavy armour plates and big guns? That is the question which is discussed in this issue, and a perusal of the article indicates that, in view of the uncertainty which, as experience suggests, attaches to international agreements of the character of the Naval Treaty concluded at Washington, the matter is one of vital importance to an island people, dependent for their security on the maintenance of the fleet, which is also the main defence of the whole British Empire.

Other aspects of naval policy are discussed by Rear Admiral W. H. D'Oyley, who emphasises the importance of maintaining an adequate number of effective cruisers for the protection of the trade routes; by Commander C. Dennis Burney, who weighs the relative claims of the advocates of sea power and air power; and by Commander H. Rundle, who contributes an article on the principles of Imperial naval defence. Commander Rundle's study of the dependence of the Dominions on naval power and their ability to co-operate with the Mother Country, finds an appropriate expansion in Mr. Archibald Colbeck's article on the strategic problem of the Pacific.

Other articles which appear in the Naval Section include an outspoken contribution by Capitaine A. Delpierre on "The French Navy in and after the War," and a review of the history and work of the Corps of Naval Constructors, by Sir Eustace H. T. D'Eyncourt, Director of Naval Construction at the Admiralty. The nation is specially reminded of the fine record of work during the war which stands to the credit of this Corps. The final article in this section deals with the scheme of naval retirement for officers which has been imposed upon the Navy by the urgent needs of economy. As Lord Lee, the late First Lord, and Admiral of the Fleet Earl Beatty, the First Sea Lord, have repeatedly stated, the Admiralty have had no more painful duty to perform since the ending of the Great War than the reduction of the officers' lists, involving the ruin of many promising careers.

As in former years, Commander C. N. Robinson deals with the progress of the British Navy; Mr. John Leyland writes on the foreign navies; these two contributions unravel with lucidity the confusion which has arisen owing to the changes consequent upon the conclusion of the war, the peace conditions, and the Washington Treaty. There is the usual chapter revealing the comparative strength of the several fleets.

In the Merchant Shipping Section, Sir Westcott Abell describes recent tendencies of policy in the mercantile marines of the world. As a student of what may be described as "the strategy of sea power," the Chief Ship Surveyor of Lloyd's Register takes a wide view of the present situation of the shipbuilding industry, and his

remarks upon the disastrous depression through which this industry is passing are peculiarly apposite in view of the attitude of labour to the unique situation which has unfortunately developed during the past few months. Shipbuilding and shipping are necessarily closely associated, and it is appropriate that, in the succeeding article, Mr. R. W. Johnson should deal with the unprecedented depression in the freight market. The significant fact which Sir Westcott Abell's and Mr. Johnson's contributions bring into prominence is that the fall in freights has not been accompanied by a corresponding decline in the cost of shipbuilding. The result is that during the present year it has been impossible to build new ships (apart from vessels for special trades) in expectation that they could be operated at a profit. It is estimated that about 75 per cent. of the cost of a new ship represents wages, and consequently labour costs are the decisive factor. Statistics are published showing the standing of the world's mercantile fleets and indicating the changes which have occurred in the relative tonnage possessed by the principal maritime Powers.

An article of peculiar importance to shipowners and shipbuilders, emphasising their inter-dependence, has been prepared for the "Annual" by Lord Inchcape. As Chairman of the P. & O. and British India Steam Navigation Companies, and as a Director of the Suez Canal Company, Lord Inchcape has approached this subject with all the advantages of long and ripe experience. Another new contributor is Sir Frederick Lewis, Bt., President of the Chamber of Shipping of the United Kingdom. Sir Frederick Lewis, who is Chairman of the Danube Navigation Company, describes the peculiar conditions which now prevail on that great highway of commerce of Central Europe. As a result of the war between Greece and Turkey, and the wide-sweeping results which have flowed from it, public interest has been turned to affairs in this part of the Continent, and Sir Frederick Lewis's explanation of the shipping situation on the Danube directs attention to a fresh aspect of the economic confusion which prevails in Central Europe.

Mr. James Richardson, who in former issues of the "Annual" has dealt with the evolution and development of the internal combustion engine adapted to marine purposes, describes the latest developments. He comments, in particular, on the engineering problem which has arisen owing to the trouble experienced in merchant shipping in connection with the use of double reduction gearing between turbines and propellers, examines the causes and discusses how they may be removed. Mr. John Anderson, with long experience of ship design, deals with the economic aspects of cargo vessels in view of the changes which are now occurring at sea and the altered requirements of shipowners. Sir Alan Anderson,

one of the joint managers of the Orient Line, writes on the question of safety of life at sea, and suggests that the demand for "boats for all" arises from failure to appreciate the conditions which arise in the event of disaster occurring to a passenger liner. Mr. F. A. Hook, in his article on "The Economics of Travel by Sea," shows that, of all means of transport, sea transport is far and away the cheapest, in view of all that is secured by the payment of passage money. Other articles include "Pilots and Pilotage," by Captain Harry Davis, Ruler of Thames Pilots, "The State and Shipping," by Mr. Sanford D. Cole, and "The Pay of Merchant Officers and Seamen," by Mr. G. A. Vallance.

The usual chapter devoted to ordnance is omitted from this issue, as the information based on the latest research and experiment cannot yet be disclosed. It is hoped in succeeding numbers of the "Annual" to resume publication of this feature.

Grateful thanks are once more expressed to many naval officers, shipowners, and others for the suggestions and assistance which they have so liberally given, and, in particular, to Mr. Andrew Scott, the Secretary of Lloyd's Register of Shipping, the repository of the most authentic statistics on shipping and shipbuilding, who has placed us under a peculiar obligation.

ALEX. RICHARDSON.
ARCHIBALD HURD.

NAVAL SECTION.

(From a drawing by Percy F. S. Spence.)

DESIGN FOR "WASHINGTON CONFERENCE" CAPITAL SHIP, WHERE GUN POWER PREDOMINATES.

(See Sir George Thurston's Chapter, p. 92.)

CHAPTER I.

The British Navy.

Reductions and Retrenchment.

The salient influences upon British naval policy have been the Treaty made at Washington, which had its effect in further reductions of ships and retrenchment in officers and men; and the Report of the Geddes Committee, having for its object a diminution in our national expenditure. The outcome is only partially seen in the reduction of the Navy Estimates for 1922–23 by 18½ millions sterling, and another substantial reduction will have been made possible when the Estimates for 1923–24 come to be presented. The hope at Washington was that peace had been established in the Pacific on a sure foundation for many years to come, and if this should prove to be the case, none will rejoice more than British naval officers, even though the sacrifices, both national and personal, which they are called upon to make cannot be described as otherwise than considerable.

The Washington Conference opened on November 12, 1921, the British delegates being Mr., now Earl, Balfour, Lord Lee, and Sir Auckland Geddes, assisted by an expert staff whose naval members included Admiral of the Fleet Lord Beatty, First Sea Lord, Rear-Admiral Sir Alfred Chatfield, Assistant Chief of the Naval Staff, and Captain Barry E. Domvile, Director of the Plans Division. No time was lost in formulating a definite programme, Mr. Hughes, the Secretary of State and head of the American Delegation, proposing a ten-years' naval holiday and a scheme for the limitation of naval armaments by the United States, Great Britain, and Japan. His speech created a profound impression, and Mr. Balfour, outlining the policy of the British Delegation, expressed his concurrence with these proposals in principle and promised that Great Britain would give them full, loyal, and complete support. This agreement was, of course, contingent on the unqualified acceptance of the proposals by the other Powers concerned. The subsequent insistence of Japan on the retention of the Mutsu made a considerable difference in the efficiency of the proposed Japanese Fleet, since the retention of this vessel gave her two post-Jutland ships, the Mutsu and Nagato, of the latest design. As Mr. Chamberlain stated in reply to a question in May last, this had the effect of disturbing to an appreciable extent the equilibrium of the American scheme, and, as a result, the United States Government felt bound to insist on completing the West Virginia and Colorado. In these altered circumstances the British Government had no alternative, if the approved proportionate

ratios were to be maintained, but to build two new ships. This was recognised by the Conference as unavoidable in the circumstances, and provision was therefore inserted in the Naval Treaty accordingly.

Capital Ships Retained.

As finally signed on February 6, 1922, therefore, the Treaty provides that the United States retains 18 capital ships of 500,650 tons, Great Britain 22 of 580,450 tons, France 10 of 221,170 tons, Italy 10 of 182,800 tons, and Japan 10 of 301,320 tons. The list of vessels is as follows:—

United States.—Maryland, California, Tennessee, Idaho, New Mexico, Mississippi, Arizona, Pennsylvania, Oklahama, Nevada, New York, Texas, Arkansas, Wyoming, Florida, Utah, North Dakota, and Delaware.

Great Britain.—Royal Sovereign, Royal Oak, Revenge, Resolution, Ramillies, Malaya, Valiant, Barham, Queen Elizabeth, Warspite, Benbow, Emperor of India, Iron Duke, Marlborough, Hood, Renown, Repulse, Tiger, Thunderer, King George V., Ajax, and Centurion.

France.—Bretagne, Lorraine, Provence, Paris, France, Jean Bart, Courbet, Condorcet, Diderot, and Voltaire.

Italy.—Andrea Doria, Caio Duilio, Conte di Cavour, Giulio Cesare, Leonardo da Vinci, Dante Alighieri, Roma, Napoli, Vittorio Emanuele, and Regina Elena.

Japan.—Mutsu, Nagato, Hiuga, Ise, Yamashiro, Fu-So, Kirishima, Haruna, Hiyei, and Kongo.

In addition to the foregoing, the United States may complete the Colorado and West Virginia, both of which were launched in 1921, and when these vessels are ready for service the North Dakota and Delaware are to be scrapped. Similarly, when the two new capital ships to be built by Great Britain are ready, the Thunderer, King George V., Ajax, and Centurion are to be scrapped.

Apart from these exceptions, the signatory Powers agree that all their other capital ships, built or building, shall be disposed of. They further agree to abandon their respective capital ship building programmes, and not to construct or acquire any new capital ships except as replacement tonnage, when the existing vessels reach an age limit of twenty years. The years in which the British vessels become due for replacement are indicated in the table of armoured ships. Under this replacement provision, the first new American, British, and Japanese vessels will not need to be laid down until 1931, and completed in 1934, to replace the Florida and Utah; the Iron Duke and Marlborough; and the Kongo respectively. No capital ship exceeding 35,000 tons (35,560 metric tons) standard displacement shall be acquired by, or constructed by, for, or within the jurisdiction of, any of the contracting Powers; and a capital ship is defined as "a vessel of war, not an aircraft carrier, whose displacement exceeds 10,000 tons (10,160 metric tons) standard displacement, or which carries a gun with a calibre exceeding 8 inches (203 millimetres)."

For purposes of record, it is well to mention the lists of ships to be immediately disposed of under the Washington Treaty. They are as follows, the age being given in parenthesis:—

UNITED STATES.—Maine, Missouri (20), Virginia, Nebraska, Georgia, New Jersey, Rhode Island, Connecticut, Louisiana (17), Vermont, Kansas, Minnesota (16), New Hampshire (15), South Carolina, Michigan (13); Washington, South Dakota, Indiana, Montana, North Carolina, Iowa, Massachusetts, Lexington, Constitution, Constellation, Saratoga, Ranger, and United States (building).

GREAT BRITAIN.—Commonwealth (16), Agamemnon (13), Dreadnought (15), Bellerophon (12), St. Vincent (11), Inflexible (13), Superb (12), Neptune (10), Hercules (10), Indomitable (13), Temeraire (12), New Zealand, Lion, Princess Royal, Conqueror, Monarch, Orion (9), Australia (8), Agincourt, Erin (7); A.B.C.D. (building).

JAPAN.—Hizen, Mikasa (20), Kashima, Katori (16), Satsuma (12), Aki (11), Settsu (10), Ikoma (14), Ibuki (12), Kurama (11); Amagi, Akagi, Kaga, Tosa, Takao, Atago (building).

America was given permission to retain the pre-Dreadnought ships Oregon and Illinois for non-combatant purposes after being disarmed. Great Britain also was permitted to retain the Colossus and Collingwood under similar conditions, but Lord Lee in his Estimates Memorandum announced the decision of the Board to scrap the Collingwood, the retention of which for non-combatant purposes was no longer necessary. Japan may retain the Shikishima and Asahi for non-combatant purposes, after disarmament.

SOME NAVAL OPINIONS.

The opinion entertained by some British naval officers, with no official responsibility, of the outcome of the Washington Conference was indicated by Admiral of the Fleet Lord Wester Wemyss, G.C.B., in an article in the *Nineteenth Century* for March, 1922. After expressing the sincere hope that the ultimate results will come up to the high expectations formed, he said that "for Great Britain voluntarily to resign that naval supremacy which to obtain and to maintain she has fought and striven for more than three hundred years, and the principle of which has ever been the first and foremost article of her political faith, is an act of renunciation unparalleled, we believe, in history. Even though it be to share the command of the sea with a Power from whom she expects nothing but friendship, and however expedient such a step may be, it can only fill with regret and even dismay those who realise its potentialities." Admiral Sir Reginald Bacon, K.C.B., in the January issue of the same review, referred to the feeling of disquietude and distrust occasioned in the minds of the people of this country by the opening speeches at Washington. Dealing with the impossibility of abolishing any class of ship, Admiral Bacon showed that if all battleships were abolished by agreement, the large armoured cruiser would become the capital ship, and if in turn these were abolished, smaller cruisers would become the capital ships of the period, and so on. "Even if we were to abolish all warships," he said, "the mercantile navies of the world would still remain. Merchant vessels are easily converted into ships of war, and most efficient they would be if ships specially constructed for fighting purposes were non-existent." The absence of certain definite classes of ship, the Admiral pointed out, would in no way affect the fundamental reasons that govern the declaration of war.

On the other hand, Admiral Sir Cyprian Bridge, G.C.B., writing

to the *Times* on November 24, 1921, to support views put forward by another flag officer in favour of an agreement to curtail the size of ships, deplored the persistence in the extravagantly costly "building slip competition," and said that "much of the huge expenditure on naval shipbuilding during the last 15 or 16 years has been nothing but waste." Similarly, Admiral W. H. Henderson, in the *Times* on November 18, 1921, said: "The capital ship of to-day is already in a moribund condition, and it is impossible to suppose she will be resuscitated after 10 years' cessation of production. It is generally acknowledged that under existing conditions she is useless for overseas operations, and the 35,000 tons limit will put an end to her development of self-defensive contrivances."

In September, 1922, Admiral Favereau, who during the war commanded a squadron in the North Sea, expressed the opinion that France would not ratify the naval agreements of the Washington Conference. Public feeling, he declared, was strongly opposed to such a concession, and among the reasons for this attitude was the view that a reduction in fleets should have been decreed in accordance with their pre-war importance, as both France and Britain, having participated in the struggle since the outbreak of hostilities, had sustained heavy losses. While in 1914 the French Navy came immediately after the American Navy, it would now, the Admiral stated, amount to only a third of the latter, Japan having almost doubled its former tonnage and the Italian Fleet, which before the war amounted to half its tonnage, being now equal to that of France. On September 25, Mr. Denby, the Secretary of the American Navy, announced that there would be no scrapping of battleships until France and Italy had ratified the Naval Treaty.

The Future of the Submarine.

On behalf of Great Britain, Mr. Balfour proposed to the Conference that submarines should be abolished by all navies. Lord Lee, in support of the proposal, contended that the submarine could not be regarded as a defensive weapon because (1) the war had shown it was unable to disturb large groups of naval units; (2) it was impotent against a big naval attack; (3) it could not stop the transportation of large masses of troops; and (4) it was suitable only as a weapon of offence against merchantmen. Almost all the other Powers, however, were in favour of the retention of submarines, and the proposal was therefore not accepted. As regards submarine tonnage, Mr. Hughes proposed 60,000 tons for America and Great Britain, and the *status quo* for France, Italy, and Japan, but France's insistence on a submarine fleet of 90,000 tons rendered impossible the conclusion of any agreement on the subject, the British, Italian, and Japanese delegates intimating that her adhesion to this total involved the abandonment of the proposed limitations upon their construction of similar craft. The following estimates of existing submarine tonnage were supplied by Lord Lee in the course of his speech in favour of abolition: United States, 83,540; Great Britain, 80,500; Japan, 32,000; France, 28,360; Italy, 18,250.

The agreements arrived at in respect of other matters, and embodied in the Treaties signed on February 6, 1922, will be found in Parliamentary paper Cmd. 1627 (Miscellaneous, No. 1, 1922). The articles of the Naval Treaty deal with the conversion of merchant ships, the construction of warships for the non-contracting Powers, the maintenance of the *status quo* in regard to fortifications in the Pacific, and other matters. A separate Treaty was also signed for the protection of the lives of neutrals and non-combatants at sea in time of war, and to prevent the use in war of noxious gases and chemicals. In regard to aircraft, however, the Committee of the Conference on the limitation of armaments passed a resolution on January 9, 1922, "that it is not at present practicable to impose any effective limitations upon the numbers or characteristics of aircraft, either commercial or military."

The Geddes Report.

The first interim Report of the Committee on National Expenditure (Cmd. 1581), published on February 10, 1922, dealt with the Fighting and Social Services, and about one-fourth of its pages were devoted to a critical examination of the Navy Estimates. The following is the summary of conclusions arrived at by the Committee, which consisted of Sir Eric Geddes, Lord Inchcape, Lord Faringdon, Sir Joseph Maclay, and Sir W. Guy Granet, with Mr. Gerald Steel as Secretary:

1. That the Estimates for 1922–23 provide for man-power on a lavish scale, and that without in any way interfering either with the manning of the fighting ships of the Navy, from Capital Ships to Submarines, as laid down by the Admiralty, there is an excess of over 33,000 officers and men in the Navy which, having regard to our recommendations respecting officers' servants class, would justify a reduction of 35,000 officers and men.
2. That the Admiralty, with a smaller Navy, are maintaining far larger shore establishments, both Naval and Civilian, than they did before the War, and we think that there are many ways in which economies could be effected by employing the Naval Ratings and Marines held for mobilisation on the work now done for the Admiralty by civilians and Metropolitan Police.
3. That the great increase in expenditure and activity in educational establishments, in Research and Experiment, and in training of all kinds, should be brought more within the limits of our reduced resources, and that the Royal Dockyards are so expensive that unless their costs can be brought more nearly to a commercial level, the work sent there should be greatly reduced.
4. That the Naval Estimates for 1922–23 should be reduced from £81,000,000 to £60,000,000 for that year, and that in the subsequent year still lower Estimates should suffice.
5. That a judicious substitution of air-power ought to result in a further reduction of the Navy Estimates.

In these recommendations no account is taken of large savings which might result from the proposals arising out of the Washington Conference, such as the discontinuance of the construction of the four new Capital Ships, for which the Estimates for 1922–23 include £11,800,000; nor of a possible reduction of the number of Capital and other ships in full or partial commission; nor of any consequential savings in connection with the provision of Oil Storage and accumulation of Oil Stocks.

No account has been taken of any reduction in pay and allowances which the Government may decide to make, and no account is taken of any abnormal increase in the Non-Effective Vote, caused by a reduction of the personnel transferred to the Retired List, with both of which items we deal separately in a later Report.

Concurrently with the publication of the report, the Admiralty, of which Mr. Amery was at the time in charge in the absence of

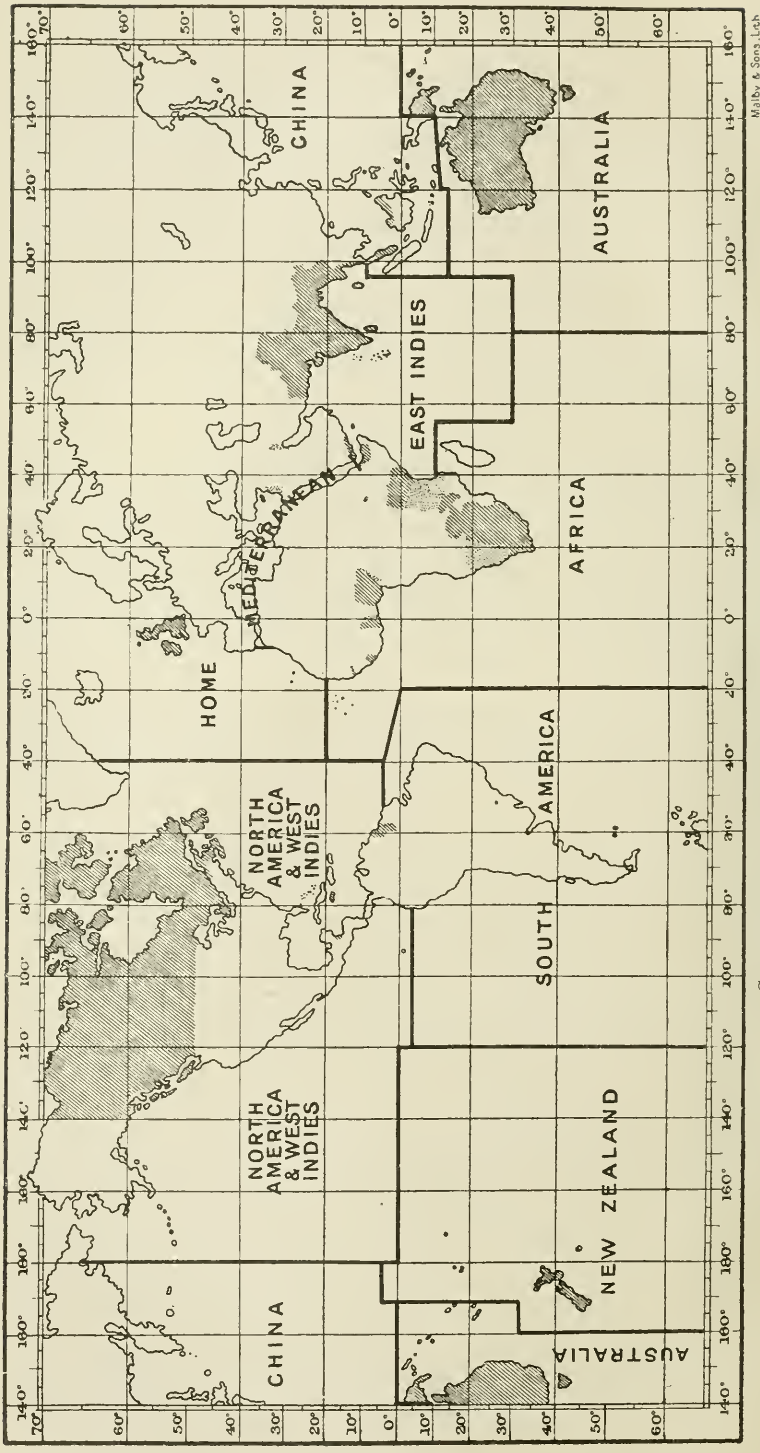


CHART SHOWING LIMITS OF BRITISH NAVAL STATIONS.

(The British Empire is shown by ruling and the Mandatory Territory of the British Empire by stippling.)

Lord Lee in America, issued a statement rebutting certain reflections which it was considered were made upon naval administration. Mr. Amery, in accepting full responsibility for this memorandum, said that, "considering the gravely misleading character of many of its (the Geddes' Report's) conclusions, I felt it my duty, as the Minister temporarily in charge of the Admiralty, to see that a definite and detailed correction was made immediately." The memorandum declared that the major recommendations in the Report were based on a serious misconception of the character and requirements of our naval organisation. The Committee recommended a total reduction of £21,000,000, but when its recommendations were analysed it was found that even if viewed in the most liberal and unpractical light they would not achieve a reduction of more than £14,000,000. The memorandum showed that the proposed discharge of 35,000 officers and men was responsible for not less than £7,000,000 out of the Committee's identifiable reduction of £14,000,000, but "even this saving would only have been possible on the Committee's light-hearted assumption that by some undisclosed means this enormous number of officers and men, scattered all over the world, could be discharged from the Navy by March 31, 1922." In reply to the Committee's recommendation to abolish officers' stewards and cooks, the Admiralty memorandum stated that in reality these ratings are already an integral part of the numbers required to fight the ship, and if abolished would have to be replaced by more expensive seamen ratings. In regard also to the criticism of an Admiral's "retinue," the Committee was evidently misled by the use of this old naval term, for instead of being the personal following of a Commander-in-Chief, most of these officers and men are borne for naval duties which must necessarily be provided for at a port containing a number of naval establishments, and have nothing to do with the dignity or personal comfort of the Commander-in-Chief. The memorandum also dealt with many inaccuracies with regard to the surplus numbers of officers, and pointed out that the discovery that the war, like that of a hundred years ago, had left the Navy with a considerable surplus over future requirements was not new. On this point it was stated:

> What is surprising is that the Committee apparently never connected the fact with the close of a great war. The Admiralty have been dealing with this problem of surplus officers ever since the war ended, and the surplus has already been reduced by over a thousand. It is not attributable to the Admiralty that the schemes which they have devised for further reducing this surplus have not yet all been put into operation.

A perusal of the First Lord's statement explanatory of the Navy Estimates will show that in several minor details the Committee's recommendations were adopted, as with regard to the doubling of fees at the Royal Naval College, Dartmouth, the substitution of Marine pensioners for Metropolitan Police in the dockyards, and other matters.

Admiralty Changes.

Considerable reductions were effected during the year in the staff of the Admiralty Office, which before the war numbered 2,072, but

which at the time of the Geddes Committee's Report in February, 1922, was 4,500. At the end of June, 1922, Mr. Amery stated in Parliament that the number of persons then employed at the Admiralty more than were so employed in the year 1914 was 1,678, if naval officers were included, or 1,561 if the civil staff only were taken. A large proportion of the increase was employed for the benefit of the fighting personnel in the distribution of prize money, medals and marriage allowance, etc., and it is hoped that a large part of this work will be completed by the end of the year, and that the numbers will then be considerably reduced.

Apart from the economies effected in the staffs of the various offices, the Department of the Admiral of the Training Service was abolished at the end of May, when Vice-Admiral the Hon. Victor A. Stanley, C.B., ceased to hold his appointment in charge. The duties for which he was responsible then devolved on other officers. The administration of the training establishments at Portsmouth, Devonport, and Shotley, was placed under the respective Commanders-in-Chief at those ports, the last-named coming under the Commander-in-Chief at the Nore. Inspection of the establishments is now arranged by these Admirals quarterly, but questions concerning the entry and disposal of boys are dealt with by the Directors of Mobilisation and Recruiting. Inspection of the Mercantile training ships is arranged by the Admiral Commanding Coastguard and Reserves; and in August of each year a commander is to be appointed to take charge of and inspect the companies of the Sea Cadet Corps officially recognised by the Admiralty.

Among other posts at the Admiralty instituted during the war and now abolished are those of the Duty Captains, which were done away with in March, 1922. It was the function of these officers to sleep at the Admiralty in turn, always ready to receive messages, answer questions, and accept any responsibility which might come along in an emergency. The three officers who last filled these posts were Captains Frederick E. K. Strong, D.S.O., Benjamin W. Barrow, D.S.O., and Edward O. B. S. Osborne, D.S.O. Their duties are now performed by the commanders in the Operations Division of the Naval Staff.

Fleet Reductions.

The further economies in the strength of the Fleet effected during the past year are outlined in the First Lord's Memorandum. Supplementing the information to be found therein, it may be stated here that the 6th Destroyer Flotilla of the Atlantic Fleet was reduced to two-fifths' complement, and based on Port Edgar, on the conclusion of spring leave on May 12, 1922, the vessels being paid off and recommissioned with volunteer complements. At the home ports, the Local Defence Flotillas were abolished on March 1, 1922, their vessels joining the local Reserve Divisions.

An important reconstitution of the Reserve Fleet took place in April. The Admiralty decided that this should in future be organised in three divisions, stationed respectively at Portsmouth, the

Nore, and Devonport; the division at Rosyth was abolished. The appointment of Vice-Admiral Commanding, Reserve Fleet, held by Vice-Admiral Sir Richard Phillimore, K.C.B., K.C.M.G., was terminated on May 15, and from the following day the Rear-Admiral, Reserve Fleet, Portsmouth (Rear-Admiral Edmond Hyde Parker, C.B.), assumed command of the Reserve Fleet, with the title of Rear-Admiral Commanding, Reserve Fleet, his flag continuing to be flown in the cruiser Courageous. The appointments of the Rear-Admirals, Reserve Fleet, at the Nore, Devonport, and Rosyth, were terminated on April 15. The command of the Divisions of the Fleet at the ports were taken over by the senior captains, with the title of Senior Officer, Reserve Fleet, Portsmouth, the Nore, and Devonport, respectively, these officers combining the command of their Division with the command of the group parent ship, or one of the group parent ships, where a Division was organised in more than one group. Subsequently, the Admiralty decided that the Division of the Reserve Fleet at Portsmouth should be administered by the Rear-Admiral Commanding, Reserve Fleet, and no Senior Officer is therefore allowed to that Division. A Senior Officer, Reserve Fleet, Rosyth, was appointed temporarily at Rosyth until the work of de-storing capital ships at that port was completed. The Reserve Fleet at the present time, therefore, is merely a cruiser fleet, having no capital ships in commission, and with only one flag officer in command. Three years ago, in its original organisation, it contained some 16 capital ships, and was commanded by one vice-admiral and five rear-admirals. On July 8, 1922, the Admiralty announced the appointment of Vice-Admiral Sir Douglas Nicholson, K.C.M.G., K.C.V.O., to command the Reserve Fleet in succession to Rear-Admiral Edmund Hyde-Parker, C.B., from October 3, when the Fleet thus once again became a vice-admiral's command.

No changes were made during the year in the organisation of the foreign stations, but the completion of the Durban, Despatch, and Diomede led to a modernising of the squadron in China, these vessels replacing older ones of the "C" type. Attention was directed to the absence of a squadron in South American waters by the holding of the centenary of Brazilian Independence at Rio de Janeiro in September. Questioned on the subject in June, Mr. Amery said that the withdrawal of the South American Squadron was decided on with great reluctance, owing to the stringent financial conditions. As the sum allowed in the Estimates for oil fuel was barely sufficient for the war training of the Fleet, a supplementary estimate would be necessary in this respect if a squadron were sent to Rio, and even for such a desirable object, the Admiralty did not feel justified in asking for this. Eventually, however, after pressure in Parliament, and after attention had been called to the fact that the United States were sending three battleships, including the Maryland; and Japan, the Idzumo, Iwate, and Asama; the British Government agreed to send the Hood and Repulse to represent this country at the centenary. In September, 1922, following upon the loss of the Raleigh off the Labrador coast, the Admiralty decided that the Constance, which was to have been relieved by the Curlew

on the North American Station, should remain there as well as the latter ship, thus bringing the Squadron under Admiral Pakenham up to its former strength of four light cruisers.

Home Commands Reorganised.

Certain changes were made in the limits of the home naval commands in the spring of 1922. Chief among these was the abolition of the Queenstown Command following upon the constitution of the Irish Free State. Vice-Admiral Sir Ernest Gaunt, K.C.B., C.M.G., the last Commander-in-Chief of the Western Approaches, returned to England on May 27 on hauling down his flag. Except for an interval of about 13 years, when a captain held this post, there had been a flag officer of the Royal Navy at Queenstown since the date of the battle of Trafalgar. At Rosyth, the post of Commander-in-Chief, Coast of Scotland, was terminated on March 31, when Admiral Sir Herbert Heath, K.C.B., hauled down his flag, his duties being transferred to Rear-Admiral Sir John Green, K.C.M.G., C.B., who became known as Admiral-Superintendent, Rosyth Dockyard, and Commanding Officer, Coast of Scotland. It was also decided at the end of March that one captain, R.N., was to carry out the Coastguard work of the whole of each command, except Plymouth, where an additional captain is allowed for the Belfast area.

In the Coastguard itself, there were no important changes beyond those dealt with in the last issue of the "Annual." Revised regulations, however, were issued on June 9 respecting the Permanent Cruiser Service. Chief officers in this Service rank with commissioned boatswains, according to seniority; senior mates with, but after, commissioned boatswains; second mates with, but after, boatswains; and chief quartermasters with chief petty officers. Ratings, other than chief quartermaster, are now extinct. The uniform was assimilated to that of the naval ranks, chief quartermasters on promotion to second mate being allowed outfit grants as for warrant officers, R.N., on promotion. Other arrangements having been made for the performance of the fishery protection duties formerly carried out by Coastguard cruisers, the officers and men of the Permanent Cruiser Service became surplus to requirements in so far as these duties were concerned, and were ordered to be employed in H.M. ships and establishments as required. A maximum establishment of 4 chief officers, 7 senior mates, and 6 second mates, was laid down for the Service, entry into which was ordered to cease.

The promised scheme of reorganisation for the Coastguard was published on September 21, 1922. The matter was stated by Mr. Amery to be one of some difficulty. Speaking on May 23 in the House of Commons, he said that the Coastguard Service, which costs £700,000 a year, is only to a very small extent a service required for naval purposes. The Admiralty have made it quite clear that of the 2,800 officers and men of the Coastguard, only about 345 are actually required in peace time for strictly naval

(From a drawing by Percy F. S. Spence.)

DESIGN FOR "WASHINGTON CONFERENCE" CAPITAL SHIP, WHERE SPEED PREDOMINATES.

(See Sir George Thurston's Chapter, p. 93.)

purposes. The others are required, in the main, for the purposes of the Customs and the Board of Trade. The Admiralty therefore proposed a conference with those departments in order to see, first of all, how it should be made clear that this outlay is not really naval expenditure; and, secondly, to find out how far, when that expenditure has been rightly apportioned, it is possible to economise in the actual numbers of the force. The main recommendations of the report of the inter-departmental committee (Cmd. 1,753) were as follows:—

1. The retention by the Admiralty of a force, under some such title as "Naval Signalling Section," for the purpose of maintaining such stations as are considered necessary to conform with naval requirements.

2. The establishment by the Board of Trade of a force, to be known as "The Coast Watching Force," to perform the duties hitherto performed by the Coastguard in connexion with the saving of life, the salvage of wreck, and the administration of foreshores, together with certain other miscellaneous duties.

3. The establishment by the Board of Customs and Excise of a force, to be known as "The Coast Preventive Force," as a supplement to the existing Waterguard staff, to perform the duties hitherto performed by the Coastguard in connexion with the protection of revenue.

On the outbreak of war, the re-creation of a Coastguard composed of forces (1) and (2), the latter passing by proclamation under the orders of the Admiralty.

New Construction: Capital Ships.

Only "token sums" were taken in the Navy Estimates of March last for the two new capital ships which this country is allowed to build under the Washington agreement—£127,040 for each vessel. In reply to Members who urged the placing of orders for the hulls, armament or machinery before the adjournment of the House of Commons early in August, so that work might be provided during the winter for large numbers of men in the shipyards and foundries who would otherwise be unemployed, Mr. Chamberlain said that, having regard to the finance of the present year, the Government was not in a position to anticipate the date already fixed for laying down the ships.

As regards the four improved Hoods, provision for which was made in the 1921–22 Estimates, the shipbuilding vote of which was passed by the House of Commons on August 3, 1921, contracts were placed at the end of October of that year to the Fairfield Shipbuilding and Engineering Co., Ltd., Govan; Messrs. John Brown and Co., Ltd., Clydebank; Messrs. Swan, Hunter and Wigham Richardson, Ltd., Newcastle-on-Tyne (with machinery by the Parsons Marine Steam Turbine Co., Ltd.); and Messrs. William Beardmore and Co., Ltd., Dalmuir (with machinery by Messrs. Vickers, Ltd.). On Friday, November 18, however, following the events in Washington, letters were despatched by the Admiralty to the firms concerned not to incur any further liabilities in respect of the four ships until the receipt of further instructions, and subsequently the contracts were cancelled.

Light Cruisers and other Craft.

Of the light cruisers remaining over from war programmes and dealt with in the last issue of the "Annual," the majority are still

in hand. No dates are yet assigned for the completion of the ocean-going commerce-protecting cruisers Frobisher and Effingham, of the "Hawkins" type, which are fitting out at Devonport and Portsmouth respectively; nor for the completion of the two ships of the new "E" class, the Enterprise and Emerald, completing at Devonport and Chatham, respectively, after being transferred from the John Brown and Armstrong yards.

The four other light cruisers, Capetown, Durban, Despatch, and Diomede, which were to have been ready for service during the year ending March 31, 1922, were all delayed. The Capetown was commissioned at Pembroke by Captain E. R. Jones on April 11, 1922, and left Devonport on June 14 for the North-American Station to relieve the Cambrian. The Durban was commissioned at Devonport on November 1, 1921, by Captain H. C. Reinold, under whom she left on November 16 for Colombo, where she relieved the light cruiser Colombo as a unit of the China Squadron on December 17. Going on to the Far East, the Durban arrived at Hong Kong on January 5, 1922. The Despatch was commissioned at Chatham on June 15, by Captain R. C. Hamilton, also for service in China, in place of the Curlew, and left Sheerness on July 5 for her station. The Diomede was commissioned at Portsmouth on April 24 by Captain Geoffrey Hopwood, C.B.E., for trials, and was ordered to leave in September for the China Station to relieve the Carlisle.

There was also delay in bringing forward to completion the 2 flotilla leaders, 6 destroyers, and 7 submarines which remained over from war programmes. The flotilla leaders Keppel and Broke (late Rooke), laid down in October and November, 1918, are still in hand at Portsmouth, and no date is assigned for their completion. Some of the destroyers, however, were passed into service. The Thracian was commissioned with a reserve crew on April 1, 1922, for service at the Nore. Her completion left only the Shikari in hand of the vessels of the Admiralty "S" type, of which 69 were ordered between April and June, 1917; 54 of these remain in the present Navy, including the Shikari. Of 1,075 tons displacement, with a length of 265 ft., these vessels carry three 4-in. guns and 1 pom-pom, and with turbine engines of 27,000 horse-power are designed for 36 knots. The four other destroyers in hand are of the "W" class—the Whitehall, Worcester, and Wren being of the Admiralty design and the Witch of that of Messrs. Thornycroft. Of the same displacement, 1,325 tons, and length, 300 ft., the Witch has a greater beam (30 ft. 7 in., as compared with 29 ft. 6 in.), and slightly less draught (10 ft. 9 in., as compared with 10 ft. 10 in.). Her engines, however, are designed for 30,000 horse-power as compared with the 27,000 of the Admiralty pattern, and this is expected to give her a nominal speed of 35 instead of 34 knots. The armament is the same in both types—four 4·7-in. guns and 2 pom-poms. None of these four boats had been commissioned in August, 1922, but the Worcester, completing at Portsmouth, was under orders to relieve the Vampire, and the Wren, completing at Pembroke, to relieve the Valorous in the Fourth Destroyer Flotilla when ready.

Two submarines have been completed since the last issue of the

(*From a drawing by Arthur J. W. Burgess.*)

H.M. LIGHT CRUISER "CAPE TOWN."

(*For particulars* *see p.* 320 *and Plate* 16.)

"Annual," K26 by Chatham Dockyard, after transfer from Messrs. Vickers, and L69 by Rosyth Dockyard, after transfer from Messrs. Beardmore. The engines of the former were manufactured by the Wallsend Slipway and Engineering Company, and of the latter by Messrs. Bellis and Morcom. Both vessels became tenders to the Dolphin at Portsmouth. The five submarines remaining unfinished are all of the "L" class, designed by Sir Eustace d'Eyncourt. L23, L26, and L27, originally ordered from Messrs. Vickers, are completing, the first-named at Chatham Dockyard and the two latter at Portsmouth. These boats displace 890 tons on the surface, and 1,080 when submerged, and are 238½ ft. long by 23½ ft. broad, with a mean load draught of 13½ ft. Their surface horse-power of 2,400 gives them a designed speed of 17½ knots; under water, with 1,600 horse-power, they are capable of 10½ knots. The oil capacity at load draught is 76 tons. L23 has 6 torpedo tubes; L26 and L27, 4. The two other remaining submarines are L53, built by Messrs. Armstrong, Whitworth and Co., and completing at Chatham; and L54, built by Messrs. Denny Bros., Dumbarton, and completing at Devonport. These are slightly heavier than the Vickers boats, displacing 960 tons on the surface and 1,150 tons when submerged, and have two 4-in. guns each, with 6 torpedo tubes. The engine-powers and speeds are the same.

Neither the Eagle nor the Hermes, described in the last issue of the "Annual," were completed by Portsmouth and Devonport Dockyards respectively as intended by the end of the financial year on March 31, 1922. The Navy Estimates show that the total estimated expenditure upon the Eagle up to March 31, 1923, is £3,832,320, and upon the Hermes, £1,743,281. The former was originally the Chilian battleship Almirante Cochrane, whereas the Hermes was specially designed by Sir Eustace d'Eyncourt for air work. The only fresh information respecting the Eagle is that she will carry, at load draught, 3,200 tons of coal, and 1,750 tons of oil. The official date for her completion is now the end of December, 1922.

Mention may here be made of the reconstruction of the Furious, the first of the large aircraft-carriers to serve at sea, and the conversion of the Glorious, light battle-cruiser, for similar duties. The Furious left Rosyth on June 17, 1922, for Devonport to undergo alterations at a cost of £300,315. She had been in charge of a care-and-maintenance party at Rosyth since June 14, 1921, and was formerly in the Reserve Fleet at that port. She has not been in service with the Atlantic Fleet since 1919, and her present alterations will not be completed until the financial year 1923–24. The Glorious is also not likely to be taken in hand until next year; at present she is employed as turret drill-ship at Devonport, and ship of the Senior Officer of the local division of the Reserve Fleet.

The only other new vessels of war to be mentioned in connection with current shipbuilding progress are submarine X1 and a mine-layer, as yet unnamed. The former was laid down in November, 1921, at Chatham Dockyard, and the latter at Devonport Dockyard, and votes of £688,679 and £377,578 respectively have been made

for them. Both have been designed by Sir Eustice H. T. d'Eyncourt, K.C.B., but particulars concerning them have not yet been made public.

Oil Fuel Storage.

In the works vote of the 1922–23 Navy Estimates, new items were inserted for storage accommodation for oil fuel at Aden, Ceylon, and Suez, and for additional tanks at Rangoon and Singapore. Work was also continued on the Clyde, and at Plymouth, Portland, the Falklands, Gibraltar, Hong Kong, Jamaica, Malta, Port Said, Rangoon, Sierra Leone, and Singapore. On the other hand, items for the Cape, Pembroke, and Grangemouth, included in the 1921–22 Estimates, were omitted, other arrangements having been made for storage at these places. In introducing the vote in the House of Commons on May 23, 1922, Commander Eyres-Monsell said that over one-third of the total effective expenditure this year is incurred for oil fuel storage installations, the amount asked for being £1,007,400. The Civil Lord stated that this was the lowest possible figure to which the cost of this absolutely vital service could be reduced, and reminded the House that the safeguarding of the British Empire and the policing of the ocean may depend no longer upon great numerical superiority, but upon the efficiency of our Fleet. One of the first necessities of efficiency is mobility, and one of the first essentials for mobility are oil tanks all over the world to which our ships may go. The Admiralty want to build up a reserve, in case of war, without depending upon mercantile supplies, having found, when the stress of war comes, that the mercantile people came to them for supplies instead of them going to the mercantile firms.

On the subject of defences for the new oil-fuel tanks, the Civil Lord pointed out that this question of defence was never raised when we had coal, and all that the Admiralty were doing was to replace coal for peace-time requirements. When it came to war requirements and a strategical reserve, some protection for them would be necessary, if indeed the tanks were not in places where there was protection already. Dealing with the possibility of utilising obsolete ships, Commander Eyres-Monsell said that these vessels would have to go through a very difficult process to be made capable of holding oil. Moreover, all the arguments which could be directed against what were called in Committee the gasometer tanks apply equally to ships. They are one and all liable to attack from submarines or aircraft, but arrangements have been made in the tanks for retaining the oil if a tank is demolished. At Gibraltar, the tanks have been placed below ground, by boring into the Rock itself, but if this plan was tried everywhere it would cause enormous expenditure. Replying to criticisms regarding the distribution of the oil-fuel stations, and particularly to that at Jamaica, the Civil Lord said that this had nothing to do with the question of war with America or war with any country, but was a peace-time requirement —it was merely replacing coal by oil, and the Fleet must have somewhere to go for fuel.

Naval Material.

Ever since the armistice, the Admiralty has been engaged in a wholesale scrapping of the older vessels of the Navy. The effect of this was clearly shown when the proposals at the Washington Conference came to be applied, for of the 20 completed capital ships to be scrapped under the terms of the Treaty, 9 had already been so disposed of, and most of the rest were on the disposal list. Writing on April 3, 1922, a correspondent of the *Times* said that to comprehend thoroughly the wholesale manner in which the Fleet had been and was being reduced in capital ships, it was necessary to examine the lists of those which had already gone and those which were about to go. Two years before, the official Navy List still showed in the effective category, although many were already doomed, the following 16 battleships and battle-cruisers, all of which have now disappeared from that list: Bellerophon, Cæsar, Dominion, Dreadnought, Hercules, Hibernia, Hindustan, Indomitable, Inflexible, Lord Nelson, Mars, Queen, St. Vincent, Swiftsure, Temeraire, and Zealandia. The following additional 15 ships were about to go on the disposal list, unless one or two were needed to be retained for non-combatant purposes after complying with the disarmament provisions: Agamemnon, Agincourt, Collingwood, Colossus, Commonwealth, Conqueror, Crescent (late Glory), Erin, Lion, Monarch, Neptune, New Zealand, Orion, Princess Royal, and Superb. The order to scrap the Lion gave rise to suggestions in various quarters that she should be preserved in recognition of her service in the three great North Sea actions, but on October 5 the Admiralty announced that the Washington Treaty named this vessel as one of the big ships which must be completely scrapped. While the Board were, therefore, unable to fall in with the suggestion that the Lion should be preserved as a national memorial of the Navy's part in the war, they were considering the question of preserving some relics from the ship for public exhibition.

The progress of the scrapping policy was naturally affected to some extent by the inability of the shipbreaking yards to cope with so many vessels. Certain new works which were started for the breaking up of ships had to suspend operations owing to the continuous and abnormal fall in the prices of steel scrap. Obsolete warships, in fact, became quite a glut in the market. The Admiralty on October 10, 1921, in view of the state of unemployment in the country, announced their readiness to sell a number of surplus vessels which they had for disposal at very moderate prices for breaking up by firms who would undertake to commence work upon the ships as soon as the sale had been completed. Cash payment was not insisted upon, sale on attractive terms being offered with the object of providing increased employment. A preference was promised to those buyers who would undertake to employ on the work of shipbreaking a substantial proportion of men of the Royal Fleet Reserve. Whether, or to what extent, this offer was taken advantage of was not disclosed. It was a source of regret, however, that so many fine vessels of the Navy found their way to foreign

shipbreakers' yards during the year. The battle-cruiser Inflexible, for instance, which served in the Heligoland Bight affair, in the Falklands victory, at the Dardanelles, and at Jutland, was towed away from Devonport on April 8, 1922, by two Dutch tugs to be broken up in Germany. As the numbers of ships at the ports declined, the appointments of Captain-in-Charge of ships for disposal were terminated. That at Portsmouth ceased to exist on June 30, 1922, after which date all ships on the sale list were placed in charge of the dockyard authorities.

Dockyard Reductions.

The First Lord's Memorandum deals at length with the policy of the Board in regard to economies in the dockyards. In the debate on the vote for Works, Buildings, and Repairs, in the House of Commons on May 23, the Civil Lord, questioned as to the retention of Pembroke Dockyard, said that it was quite true that for purely naval purposes we could do without this yard, "but looked at from the national point of view, I do not think it would pay to close up Pembroke." He described it as a place which had grown up with the Navy, and which had nothing else to depend upon, "and it would be destitute if we turned away from it altogether." He thought that when the compensation to be paid was considered, and the claims of the established men, and the out-of-work donations which would be incurred, the country would not gain much financially by closing down the yard. Turning to Rosyth, the Civil Lord stated that this would be retained as a docking base, but expenditure had been considerably reduced because no repairs would be undertaken there. On another occasion in May, 1922, Mr. Amery stated in reply to a question that the total annual saving which would result when Pembroke Dockyard was closed down or disposed of to a commercial firm as a going concern was approximately £120,000, subject to a certain increase for some years on the non-effective votes. He could give no estimate of the sum which would be realised if the property were sold, as it would entirely depend on the market, and up to that time there had been no commercial demand for this establishment. "From the purely naval point of view," added Mr. Amery, "there would be an economy in closing the dockyard." An unhappy feature of the retention of the yard was the excessive cost of work performed upon certain vessels. In June, the Civil Lord stated in reply to a question that the amounts by which the cost of the work in the following instances had exceeded the original estimate were, as far as could be ascertained: On the light cruiser Capetown, £148,000; on the drillship President (ex-Saxifrage), £18,500; and on the oil-tanker Oleander, £17,000. These excesses were contributed to by a number of causes, including additional work ordered, changes in wages and cost of materials, delays due to strikes and more urgent work, and generally to labour conditions during the last three years. But these conditions affected the work of all the dockyards, and the Admiralty were of opinion that the unsatisfactory results at Pembroke must be attributed mainly to the inadequate output of work by the men

(From a drawing by Arthur J. W. Burgess.)

H.M. FLOTILLA-LEADER SHAKESPEARE.

(For particulars see p. 360.)

employed there. The Board called serious attention to the necessity for improvement, and were understood to have threatened that unless this was forthcoming they would close down the yard.

The Committee on National Expenditure criticised the policy of guarding naval establishments, undertaking fire brigade duties, etc., by means of the Metropolitan Police, which seemed to them "to be entirely wrong, and the cost excessive." The total cost to the State for each policeman was put at £400 per annum, and it was recommended that Metropolitan Police be employed only in such numbers as the Commissioner considers necessary for detection of crime, but that all duties of watching, gate guarding, fire brigade work, and sentry duty, including conducting visitors round the dockyards, should be carried out by active service marines or naval ratings retained for mobilisation of the war fleet.

In the First Lord's Memorandum it will be seen that a start has been made in the withdrawal of the Metropolitan Police from the magazines and ordnance depôts and the substitution of a small force of Marine Pensioner Police. The Metropolitan Police thus relieved were ordered to be transferred by the Commissioner to other duties at no expense to the men themselves, in accordance with the usual procedure adopted in the case of transfers made in the interests of the Service. The strength of the new Marine Police in the current Estimates is fixed at 320.

Retrenchment in Personnel.

Overshadowing all questions concerning the personnel of the Royal Navy, both officers and men, during the past year has been the need for retrenchment. The special schemes of retirement and discharge instituted by Admiralty orders of May 12, 1922, produced radical changes in the crews of ships and the staffs of establishments. In addition, there were the changes in the Fleet already described, and also a centralisation of the training establishments at the ports. Over and above all these movements, the Admiralty decided after the Washington Conference, "in view of the general relaxation," as Mr. Amery said on May 23, "of the position in the world," to carry out a 16 per cent. reduction in the complements of big ships, bringing them back to something like pre-war complements. He had previously explained how the experience of the war had shown the need for a large number of additional officers and men to handle the extra equipment—nine wireless sets instead of two, more formidable anti-aircraft armaments, paravane gear, and so on—but what had since taken place, he said, was a reduction to a peace footing. "If war mobilisation was declared," he added, "we should bring these men back from the schools and the training establishments in order to meet the active needs of the Service."

On February 20, 1922, the Admiralty announced an impending reduction in the list of Flag Officers by 15, to take effect from August. Subsequently it was stated that the number would be obtained by reducing the establishment by two admirals, three vice-admirals, and ten rear-admirals, making the revised figures: admirals, 10;

vice-admirals, 19; and rear-admirals, 45; with three admirals-of-the-fleet as formerly. The aggregate figure would therefore be reduced to 77 from 92. The last-named was fixed as long ago as December 8, 1903, but by Order in Council of September 30, 1914, the numbers were temporarily increased during hostilities. In addition, by Orders in Council dated February 13, 1912, October 14, 1913, and November 21, 1921, officers lent to the Naval Forces of the Dominions and to foreign governments were made supernumerary to the established numbers. As regards the number of flag officers in active employment, Mr. Amery said that in March, 1914, there were 54, but by May, 1922, it had been reduced to 43, and it was hoped to reduce it by three more before the end of the calendar year. The motive when the number of rear-admirals was increased from 43 to 55 in 1903, was to have a large list of young flag officers from whom selections might be made for commands, and the increase was coupled with more stringent rules of retirement for non-service. The idea now, however, is as stated by Mr. Amery on May 23, that "from the point of view of the needs of the Service we cannot keep a large number of officers, either of flag rank or of lower ranks, for whom we cannot find any work. It is only from that point of view that we have dealt with the question."

Special Retirement Scheme.

As the special scheme of retirement dated May 12, 1922, for removing the surplus of officers is dealt with in another chapter, it need only be mentioned here in passing. It is inevitable that it should present certain points of criticism. The Admiralty recognised, for example, that in certain cases officers who retired under it were at an advantage over those who retired under the scheme of April 1, 1920, and still more at an advantage over officers who retired voluntarily under the ordinary regulations. This difference of treatment, however, is inherent in any special scheme of retirement, the terms of which must depend upon the circumstances existing at the time it is brought into force, and it has never been the practice to allow officers to participate in a scheme which has come into operation after they have retired or applied to retire. One class of officers in particular who represented that they were somewhat hardly treated were the surgeon-commanders. Early in July, the Civil Lord, replying to a question, made the following statement in regard to them:—

"The position of certain senior Surgeon Commanders has already been brought to the notice of the Admiralty. The Halsey Committee, on whose recommendation the changes made in the rates of retired pay in 1919 were based, did not propose an all-round percentage increase in the rates, but aimed at assimilating, as far as possible, the rates in the various branches, and with this object, laid down a uniform scale of retired pay for all officers of the relative rank of Commander, including Surgeon Commanders. On this scale, the rate of retired pay was subject in each case to a maximum of £600 per annum. As the maximum obtainable by a Surgeon Commander under the old Regulation was £547 10*s.* per annum, the rates for certain Surgeon Commanders under the new Regulations were increased by less than 10 per cent., and the percentage increase generally is smaller than that in other branches, where smaller maxima were previously in force. Such a difference, however, is inherent

in any scheme which has for its aim the assimilation of the conditions in various branches, and while, therefore, some officers may have benefited more than others by the changes made, the Admiralty do not think it desirable to make any modifications in the scheme in order to meet the case of particular classes of officers."

It was unfortunate that the impression created upon the minds of the doctors led to a resolution being passed at the meeting of the British Medical Association at Glasgow on July 25, 1922, approving of the Council's decision to advise recently-qualified medical practitioners to consider seriously the disadvantages to which it was alleged they were liable if they placed their careers in the hands of the Admiralty. It was argued that, in spite of prospects held out to them that if they attained the rank of Surgeon-Commander they would be retained until the age of fifty-five, such men were being discharged without adequate compensation such as was being given to officers of other branches. On the whole, however, the retirement scheme was well received, and it was recognised that the Admiralty, assisted by the Personnel Committee, had discharged with courage and impartiality a difficult, delicate, and unwelcome task.

The "Incapacity" Order.

A few days before the publication of the retirement scheme, the Admiralty were given authority, by Order in Council of April 21, 1922, to place on the retired list, irrespective of age or service, "any officer of the Royal Navy or Royal Marines whom they consider to be unfit for further employment by reason of incapacity, peculiarity of temper, or other defect not amounting to misconduct, and not caused by intemperate or irregular habits of life." The issue of this order gave rise to a good deal of misgiving, and by many was erroneously assumed to be intended to secure the reduction of officers surplus to requirements. The Admiralty therefore announced that it was quite unconnected with the special retirement measures. "Hitherto," said the Board, "it has only been possible to effect the compulsory retirement of officers under what is known as the Misconduct Order in Council, which entailed forfeiture of not less than 10 per cent. of the retired pay of any officer concerned. The new Order in Council is designed to meet the case of officers whose retention in the Service was undesirable for reasons other than misconduct, and to whom the Misconduct Order in Council with its attendant penalties would, if applied, operate harshly. It has long been the practice to deal with such cases by placing the officers permanently on half-pay, and it is considered that it will be in the interests of the officers, as well as of the Service, that the alternative of retirement shall exist in cases of this kind."

The number of officers who voluntarily sent in their names to retire under the special scheme was relatively small. In accordance with the announcement of the Admiralty when publishing the scheme, therefore, a number of officers were notified that they must go in order to complete the necessary reductions. They were given the alternative of retiring with the special terms, or of being placed on unemployed or half-pay (if not already so situated) and informed

that no further employment was available for them, in which latter case they would be automatically retired under existing regulations on completing the period of non-service. One class in which there was no need for this notification was warrant officers and above under the age of fifty. On June 16, 1922, the Admiralty were able to announce that the number of applications to be retired under the special scheme was greater in all branches than the number of officers to be reduced, so that it had become necessary to close the list at an early date. All officers of this class serving on home stations who had not already applied and wished to be considered were ordered to forward their applications in time to reach the Admiralty by June 20, and applications from those abroad had to reach the Admiralty by July 31.

Officers' Training Courses.

The doubling of the fees for cadets at Dartmouth, as recommended by the Committee on National Expenditure, is the principal change in regard to the education of junior officers made during the year. A revision has, however, been made in the syllabus of instruction on board the cadets' training ship Thunderer. Instead of each cruise lasting for an unbroken period of twenty-seven weeks, the course of instruction now covers two terms, each of about twelve weeks. The marks in the passing out examination have been revised, and a reduction made in the time devoted to engineering. As regards the special entry cadets, an order of November 4, 1921, reduced their period of training to twelve months, or three terms. Two of these were to be spent on board the Antrim, signal and wireless experimental ship at Portsmouth (since relieved by the Yarmouth), and the third term in the Thunderer. Two hours' instruction instead of one were ordered to be given in the Antrim, the additional time being considered necessary and not excessive.

New regulations for the entry and training of paymaster-cadets, which were issued on September 8, 1922, showed that in future there will be two entries annually instead of one—the first on February 1 (following examination in November), and the other on September 1 (following examination in June). The February entry will join H.M.S. Courageous, flagship of the Reserve Fleet at Portsmouth, or another Reserve ship, and carry out approximately three months' training, afterwards joining the seagoing training ship for naval cadets for the summer cruise. The September entry will proceed direct to the seagoing training ship.

In September, 1921, twenty commanders, R.N., were appointed for a Technical Course at Portsmouth similar to that which had previously been attended only by captains. In July, 1922, however, after two terms had been completed, the Admiralty decided that the course for commanders would no longer be conducted separately, and while the Senior Officers' Technical Course was intended primarily for captains, applications from commanders would also be considered. The other courses of various kinds, at Greenwich, Portsmouth, and elsewhere, for officers, continue as

before. On October 21, 1921, the Admiralty decided to institute on shore a six-months' course for acting sub-lieutenants at Greenwich, and short courses in gunnery (twelve weeks) and torpedo and pilotage (six weeks). Instruction in *morale* was ordered to be given both at sea and at Greenwich. The first of the new courses began on April 12, 1922, midshipmen on foreign stations, on completing their seamanship examination, being discharged in sufficient time for them to join the College by this date. In future all acting sub-lieutenants will take this course, on completing which all those who pass will be confirmed in the rank of sub-lieutenant and appointed to seagoing ships to obtain their watch-keeping certificates and recommendations for promotion to lieutenant. The course of naval studies at Cambridge University established immediately after the armistice for sub-lieutenants who were sent to sea during the war before their training at the naval colleges was completed, will be brought to an end in the March term, 1923. Altogether 1,600 sub-lieutenants, of the average age of 20–21, had the advantage of the course, which consisted of two terms at the University and studies in mathematics, navigation, physics, and marine engineering, and, in addition, history and literature. The sub-lieutenants were distributed among the various colleges.

Specialisation in the Navy.

The official list of officers selected for long courses, issued on July 21, 1922, showed that 24 officers, including one of the Royal Canadian Navy, had been selected for the War Staff course; 10 to specialise in gunnery; 8 in torpedo; and 6 in signals. The only important change in regard to specialisation instituted since the last issue of the "Annual" concerns the submarine branch. The future requirements of this service were carefully scrutinised, and an order dated March 10, 1922, announced that a greater proportion of junior officers would be required than of more senior lieutenants and lieutenant-commanders. Consequently, a number of junior officers who enter the service must sooner or later revert to general duties. The Admiralty therefore approved of a revised procedure whereby junior officers will continue to be selected for submarines from volunteers amongst junior lieutenants and sub-lieutenants who have completed their courses for the rank of lieutenant—in the case of the latter, watch-keeping certificates will be granted after service in submarines. Officers will be appointed to submarines for three years in the first instance, and will then return, either temporarily or permanently, to the general service. Before returning to the latter, the officers will be eligible to volunteer to specialise in submarines, gunnery, torpedo, navigation, etc. Those selected for submarines will be definitely earmarked for that service, to which they will return after one year in the general service. They will only revert again to the general service under the same conditions as other specialists, that is, in consequence of promotion, at their own request, for unsuitability, medical unfitness, misconduct, or lack of suitable submarine appointments owing to age and seniority.

Submarine specialists, however, at about eight years' seniority as lieutenants, will continue to be sent to seagoing ships for general service experience for two years approximately, as formerly, afterwards returning to submarines. In announcing these revised arrangements, the Admiralty pointed out that service in submarines in the junior ranks provides excellent training for officers who ultimately desire to specialise, and is a good preparation for service in destroyers on return to the general service. The official estimate of the future requirements of junior officers for submarines is about 35 per year.

In July, the Admiralty announced certain modifications of the regulations under which officers of the Naval Reserves may specialise in submarine duties. Sub-lieutenants, R.N.R., of the military branch will be eligible to volunteer for this service, and a selection will be made from them, before they start their twelve months' training afloat. The provision that officers selected to specialise must not be below the rank of lieutenant is modified so far as submarine specialists are concerned. Selected officers will undergo a two months' course at Fort Blockhouse, followed by service afloat in a submarine to complete twelve months' training, the two months' preliminary training taking the place of the usual course in gunnery. R.N.R. officers who have completed their year's training under general service conditions are not eligible to specialise in submarines unless they are available for the further term of service in these boats after qualifying at Fort Blockhouse. Those who satisfactorily carry out their submarine training will be distinguished in the Navy List by the symbol "S.B." The period of their service in submarines will be from the age of twenty-one to thirty-two, periodical training during this period being given at a submarine depôt. These officers will form a first reserve of third officers of submarines on mobilisation. Volunteering for submarines is also open to officers of the special branch, R.N.V.R., and to engineer officers, R.N.V.R., but executive officers of this force, and ratings of the R.N.R. and R.N.V.R., are not eligible for the service.

A new specialist branch in the Royal Navy came into being by an Admiralty order dated October 28, 1921, providing that air observers should form a separate branch similar to those for specialists in gunnery, torpedo, navigation, and signals. Eight officers were to be selected each half-year, and although junior lieutenants of two years and upwards were generally to be selected, as in other specialist branches, a few commanders and lieutenant-commanders were required. Training courses, beginning in May and November each year, were to include two months' preliminary training at the naval schools in gunnery and signals, and five months at the Seaplane Training School at Lee-on-Solent. On qualifying, officers were to be eligible for appointment as observers in aircraft carriers in the Royal Navy, and when actually detailed for such work were to receive special allowances. This scheme was evidently intended to overcome the difficulty in regard to naval officers having to be seconded to the R.A.F. before taking up air work. In 1920, when invitations were issued with this object, only seven naval

officers volunteered, there being apparent a reluctance to join a service other than their own. No officers have been seconded to the R.A.F. since then. Under the new arrangement, however, officers retain their naval rank and wear naval uniform while undergoing their course of training.

The Length of Commissions.

In order to effect economy in the cost of carrying out foreign reliefs and to reduce the number of men duplicated by "crossing reliefs," the Admiralty on February 24, 1922, ordered that the normal length of commission of ships on foreign stations should be not less than two and a half years (instead of two years), exclusive of the time spent by the crews on passage or waiting for suitable opportunity for passage. The time away from home ports is not to exceed three years. Subsequently, the new order was extended to apply to naval establishments on foreign stations in the same way as to H.M. ships, the only exceptions being in the case of those stations where for climatic reasons period of service is limited. These include the wireless stations at Aden, Bermuda, Demerara, Jamaica, Matara (Ceylon), and Singapore, the crews of which remain eligible for relief after one year's service. Harbour establishments abroad (*i.e.* H.M. ships, Egmont, Cormorant, Malabar, Afrikander, and Tamar), and the China River gunboats, are to continue to receive new half crews annually. The length of commissions of ships employed in the Red Sea, the Persian Gulf, and on the Danube will be limited to two years.

Uniform and Victualling.

Very few changes, and these only of detail, were made during the year in the uniforms of the Royal Navy. On November 25, 1921, it was ordered that for all officers, except subordinate officers, the great coat was to be a compulsory article of uniform and the watch coat to be optional. Officers who were without a great coat were given a reasonable time to provide one. The Admiralty also directed at the same time that at funerals in bad weather the dress was to be modified to cocked hat, great coat, and sword. On May 5, 1922, alterations were made in the manner of wearing the white uniform prescribed for hot climates, the changes being in the nature of standardising certain "rigs," the occasions for wearing which had formerly been left to the discretion of the senior officer present. No. 8 dress was subdivided into three "rigs"—No. 8 (white full dress), No. 8a (white dress), and No. 8b (white undress). It was also ordered that officers in white uniform landing in charge of armed parties were to wear black boots and gaiters; and the helmets might be worn with No. 3 dress (frock coat with epaulettes) at the discretion of the senior officer. It was in 1885 that naval officers were given a complete dress for the tropics. By Fleet order of July 14, 1922, the Admiralty laid down the uniform to be provided

by probationary midshipmen, R.N.R., appointed for six months' training in the Fleet.

In June, 1922, the Victualling Department issued a revised edition of the "Manual of Naval Cookery." This booklet of 162 pages amply demonstrated the great progress made of late years in the preparation of the food of British naval officers and men. Following a chapter on general instructions, as to cleanliness, methods of cooking, and the like, there are in the "Manual" twelve chapters devoted to soups, fish, meat dishes, vegetables, puddings, beverages, sauces, spices and condiments, invalid cookery, miscellaneous hints, breadmaking, and cakes. There are also appendices dealing with bakery routine, field cooking for landing parties, and ready reckoners for calculating rations in bulk.

With the large number of boys now borne in battleships and battle-cruisers, it was decided by the Admiralty in May, 1922, that the practice, which had been adopted in several ships with marked success, of victualling the boys in a general mess, should be recognised as the proper system of messing boys where the numbers were sufficient, and the general arrangements of the ships permitted this to be done. Boys were ordered to be continued on the standard ration and messing allowance, the latter being pooled; they were not to be placed on victualling allowance. The non-service provisions required were to be obtained from the canteen, except articles of local produce, such as fresh fish, fresh eggs, fruit, and vegetables, which could be purchased locally when occasion offered. The rebate of 5 per cent. paid by the Navy, Army and Air Force Institutes on the monthly turnover of the boys' general mess was ordered to be divided between the ship's fund and the mess (2½ per cent. to each), the amount for the boys' general mess being abated from the total of the bills for provisions supplied by the canteen to that mess.

Mention may here be made of improvements effected during the year in the libraries and bookstalls of H.M. ships. In December last the Admiralty decided to modify the composition of officers' libraries so as to extend their scope and facilitate the introduction of new works as others became out of date. Under the former system, officers' libraries were divided into three classes according to the ships' complements, but within the limits of these classes the books supplied were the same for all vessels. Under the new scheme, the books to be supplied to all ships alike form only a portion of the library, being restricted to standard works required for the purposes of reference. Apart from this reference library, which will be common to all ships, there are "circulating unit libraries" of a level value, but composed of different books, and varying in number from four units down to one unit according to the class of library allowed to the particular ship. These units are available for interchange between the different ships of a squadron as may be desired. Up to May 5, 1922, the list of articles which might be sold at the bookstalls on board ship were limited to daily and weekly newspapers, magazines, and novels. From that date the Admiralty approved that the list should also include books, writing paper, envelopes,

(From a drawing by Arthur J W. Burgess.)

H.M. TORPEDO-BOAT DESTROYER THRACIAN.

(For particulars see p. 360.)

postcards, picture postcards, photographs of ships, blotting paper, fountain pens, penholders, nibs, pencils, labels, and indoor games. Ships' brooches may be added to the list at the discretion of the local Commander-in-Chief.

The cash payment system has been adopted for all issues of clothing, soap, and tobacco on repayment to officers, men, and boys in all ships and establishments, with the exception of boys in the training establishments, in respect of whom the system of charging the amounts on the ledger is to remain in force. Under the new system, which comes into force on January 1, 1923, all clothing, soap, and tobacco taken up on repayment is to be paid for in cash at the time of receipt.

Recreational Training.

Excellent work in the promotion of physical and recreational training among officers and men has been done during the year under the auspices of the department specially created for this purpose in March, 1920, of which Captain Charles W. R. Royds, C.M.G., became director on May 17, 1921. The physical training schools at the ports now make a speciality of training officers, petty officers, and non-commissioned officers, not merely to be drill instructors as in past days, but recreational organisers and leaders of games. An indication is afforded of what is being done in this respect in the "Handbook of Physical and Recreational Training, Vol. II., for the use of the Royal Navy," issued in April, 1922. This volume contains details of a number of minor games and small-space recreations specially suitable for those on board ship, such as "Ankle Hooking," "Melting Candles," "Cat and Mouse," "Sea Serpent" and "Skin the Snake," the object being to induce the "90 per cent." of every group, or company, to join the "10 per cent." in their activities.

As to the larger sports, there have now been organised special associations for the promotion of hockey, Association and Rugby football, boxing, fencing, golf, lawn tennis, cricket, swimming, and athletics. In January, 1922, there was issued a "Sports Handbook" by the R.N. and R.M. Sports Control Board, five thousand copies being distributed free to officers and men. It is the intention to make this an annual publication, and in the next issue Fleet Regatta Rules will be included. The 1922 Handbook points out that no moneys have been received by the Control Board from public funds, but since its formation in March, 1920, the Board has disbursed for the recreations of officers and men, as free grants, £6,850; and as loans, £1,423. In addition, the Board has purchased a recreation ground at Devonport for use as a Rugby football ground by officers and men, at a cost, with reconditioning, of about £9,000. In his report for the period ending April 30, 1922, Engineer-Commander E. W. Roberts, the Secretary of the Sports Control Board, and a well-known international Rugby football player and former captain of England, refers to the popularity and usefulness of the R.N. cruising clubs and accommodation registers, when ships are in localities for

which these clubs were intended. A total of 39 cruising club property boxes had been supplied up to April 30. In its short existence, the Sports Control Board has indeed achieved a great amount of good on behalf of the personnel of the Navy.

The Welfare Committee.

In November, 1921, after inquiries made through the Commanders-in-Chief, the Admiralty decided to revive the machinery of the Welfare Committee, which had been in abeyance for fifteen months. Modifications shown by experience to be necessary were made. The welfare machinery, for instance, is to be put into operation biennially instead of annually, so as to give more adequate time for the procedure at the ports to be carried out and for requests to be duly considered by the Commanders-in-Chief and the Admiralty. The system by which representatives of the men met in London was abolished, and all meetings at the ports will be convened under the authority of the Commanders-in-Chief and attended by officers detailed by them. These officers do not take part in discussion with the men, but may give advice if asked. The central meeting of the Welfare Committee for 1922 was held at Chatham from May 24 to 30, and from it 56 requests were put forward, arranged under the headings of: Welfare, Pay and Allowances, Pensions, Service and Promotion, Clothing and Uniform, Leave and Travelling, Accommodation and Messing, Status, and Miscellaneous. The questions of canteen arrangements, benevolence, and sports were held to be outside the purview of the meeting by the Admiralty, as proper organisations existed for dealing with them. At the Admiralty, the general requests were examined by the Naval Personnel Committee and the departments concerned, and submitted to the Board.

An important event in connection with the welfare of the men of the Royal Navy was the establishment, by Admiralty order dated May 12, 1922, of the Royal Naval Benevolent Trust, to absorb the Grand Fleet Fund and kindred funds existing for the benefit of the lower deck, both as regards serving and ex-service members. The Admiralty considered that it would be in the interest of the Service that the administration of all naval benevolent funds should, so far as practicable, be concentrated in a single organisation and that this was also desired by the Service generally. The King's approval was therefore obtained for the formation of the new Trust under Royal Charter. The organisation provides that representatives of the men, including ex-service representatives, shall have a controlling voice in the actual administration of the benevolent funds, subject to the objects of the Trust not being departed from; and for the association of the naval authorities with the men's representatives so far as the policy of the organisation is concerned. There are five Governors of the Trust, three being the Commanders-in-Chief at the home ports, the fourth the Adjutant-General, Royal Marines, and the fifth appointed by the Admiralty. Captain Sir Lionel Wells, C.B., C.M.G., C.B.E., R.N., is the first officer to fill the last-named

appointment. There are local committees of the Trust at Portsmouth, Plymouth, and Chatham. The funds handed over by the Admiralty to the Central Committee amounted to about £66,000.

The Naval Reserves.

The number of Royal Naval Reserve officers who became due for training in 1922 was higher than in the two previous years, owing to the fact that officers who were mobilised for a minimum period of twelve months during the war were excused training for three years subsequent to demobilisation. Those demobilised in 1919, therefore, became due for training again in 1922, and there was an increase of £25,700 in the vote for their pay as compared with 1921.

In September, 1922, the R.N.R. Advisory Committee, formed in connection with the revised organisation of this force in accordance with post-war needs, was appointed under the presidency of the Admiral Commanding Coastguard and Reserves; its composition is shown in the Navy List. This Committee meets at the Coastguard and Reserves Office, 58, Victoria Street, S.W.1, as necessary.

On October 5, 1921, the promotion was made of the first officer of the Royal Naval Reserve to receive the permanent rank of Commodore, R.N.R., under the revised regulations, the officer chosen being Captain Charles A. Bartlett, C.B., C.B.E., R.D., the senior R.N.R. member of the Advisory Committee. A week later, the promotion was announced of the first Commodore in the R.N.V.R., the officer chosen being the senior captain in that Force, the Marquess of Graham, C.B., C.V.O., who had commanded the Clyde Division since July 30, 1903.

By order of December 9, 1921, changes were effected in the regulations governing the obligatory training of captains and commanders in the Royal Naval Reserve. Hitherto, these officers had been liable for 28 days' naval training every three years, to be taken either in one period or in two periods of 14 days each. The regulations now provide that courses in gunnery (21 days) and torpedo (21 days) must be taken within five years of promotion, and a signal, submarine, and aircraft course (14 days) within six years of promotion. These courses are the same as those laid down for the Senior Officers' Technical Course in the Royal Navy. Requalifying courses must be carried out at intervals of not less than four, or more than six, years from the date of qualification or requalification in the particular subject concerned.

For the first time for many years, the Navy Estimates of 1922–23 contained no provision for colonial branches of the Royal Naval Reserve. It was notified last year that the future of the Newfoundland and Malta branches was under consideration, and both these forces have now been disbanded. The Newfoundland branch, founded in 1898, and assisted by an annual subvention from the Newfoundland Government since 1902, supplied 1,713 members to the Navy during the war, and had a creditable record of service. Its training ship, the Briton, was placed on the sale list.

Pay and Allowances.

The agitation in favour of the grant to married naval officers of an allowance similar to those paid to Army and Air Force officers did not succeed in its purpose owing to the very strong feeling on the part of the Government in favour of curtailing expenditure. With the exception of the schoolmaster branch, such changes in allowances as were instituted during the year were in the direction of reduced emoluments.

As from July 1, 1922, table money to all flag officers and commodores was reduced to the pre-war rates. This reduction was "rendered necessary by the very urgent need for economy," and in view of this, entertaining on the scale hitherto customary was not considered necessary or justifiable. The estimated saving consequent on this reduction was, in comparison with rates in force prior to April 1, 1922, £15,650; and in comparison with rates in force between April and June, 1922, inclusive, £11,900. The corresponding maximum reductions in any one case were £821 and £639 per annum respectively.

An Order in Council published in the *Gazette* in November, 1921, abolished the allowance of 1*s.* 6*d.* a day to mates and sub-lieutenants, R.N., when appointed for navigating duties. Provision, however, was made that these officers, if appointed in lieu of a navigating lieutenant in a ship in which a qualified navigating officer was allowed by complement but not borne, might receive an allowance of 1*s.* a day.

The provision allowance for naval officers was reduced, from February 1, 1922, from 5*s.* to 4*s.* per day, and the annual rate from £80 to £65. On April 1, a further reduction from 4*s.* to 3*s.* 8*d.*, and £65 to £60 per annum, took place. Concurrently with the latter, messing allowance was reduced from 11*d.* to 10*d.* a day; victualling, from 1*s.* 10*d.* to 1*s.* 8*d.*; and Sunday dinner, from 4½*d.* to 4*d.*; while provision allowance for men (including long leave allowance) was altered from 3*s.* to 2*s.* 9*d.* per day.

Hard-lying money was abolished in destroyers, flotilla leaders, sloops (other than surveying vessels), and small monitors as from June 1, 1922. The living and sleeping conditions in these vessels, as compared with those which existed in the original torpedo-boat destroyers in which hard-lying money at half-rates was first instituted in 1894, were stated no longer to justify the payment of this allowance to ratings serving therein under normal conditions. The Admiralty reserved power to resume payment in these vessels when engaged in actual hostilities, or, at their discretion, when engaged on special operations.

From December 1, 1921, dental officers in the Royal Navy were ordered to be paid on the dental officers' scale, which is in most cases from 2*s.* to 3*s.* a day less than that of the regular medical scale. Dental officers were to be paid at this rate irrespective of the fact that they might possess medical qualifications. If, however, possessing the latter, they are appointed for medical duties in addition to their dental duties, they may be paid on the medical officers' scale.

The concession of the issue of cheap railway tickets at the public expense for journeys on leave of officers and ratings of the Royal Navy, Royal Marines and Coastguard, and Sisters of Queen Alexandra's Royal Nursing Service, was withdrawn on April 1, 1922. After this date, except when the railway companies provided special cheap trains or facilities in connection with leave journeys, all personnel proceeding on leave have been required to pay the same fares as the general public. Questioned on the subject in the House of Commons on May 2, Mr. Amery said the Admiralty had received no details of the number of men who were unable to take their leave, but it was unfortunately probable that the lack of cheap travelling facilities was resulting in hardship. Much as the Admiralty regretted this, they could not adopt the suggestion to renew the practice of paying part of the fare to the men's homes. The pre-war facilities were being afforded by the railway companies, and the companies had been pressed to revert to the pre-war arrangements. The Secretary was pleased to add that the Great Western Railway Company did grant excursion fare rates to men proceeding on Easter leave from Devonport. From October 1, 1922, however, the railway companies agreed to make cheap travelling concessions to naval officers and men on leave, and to issue return tickets, first class for officers (with a minimum fare of 5*s.*), and a second or third class for ratings, at a single fare and a third for the double journey. The tickets are available between all stations in Great Britain, and stations or ports in Great Britain and ports in Ireland, *via* direct steamer (including Belfast, *via* Stranraer and Larne), except that for officers the tickets will be issuable for journeys to London only.

In April, 1922, the Admiralty announced that the final distribution of the balance of the money available in the Naval Prize Fund would begin at once in the Department of the Accountant-General. The share for thirty months' qualifying service was 75*s.*, or 25*s.* more than the corresponding share in the distribution which began two years previously.

On July 26, 1922, the Naval Discipline Bill was read a third time in the House of Commons, and it received the Royal Assent on August 4. This Act provides for a reduction in the maximum term of penal servitude for serious offences from five years to three; enables courts-martial to adjourn for a week, if desirable; and makes arrangements possible whereby deserted wives can be paid a proportion of the husbands' pay, provided they have been left destitute or deserted without reasonable cause.

The Schoolmaster Branch.

In accordance with the promise made by Mr. Amery during the debate on the Navy Estimates on July 18, the Admiralty on July 21, 1922, issued fresh regulations concerning the pay, promotion, and retired pay of schoolmasters in the Royal Navy. The Board state that their policy is to base the constitution of the schoolmaster branch solely on the educational requirements of the Naval Service and the relation of this branch to the teaching profession generally.

The rates of pay were increased by amounts varying from 6*d.* to 2*s.* 6*d.* a day. The following is the scale, the old rates being given in parentheses:—Schoolmaster candidate, 12*s.* a day (9*s.* 6*d.*); probationary schoolmaster, 12*s.* 6*d.* (10*s.* 6*d.*); schoolmaster (warrant officer), after 1 year from entry, or on confirmation, if later, 13*s.* (11*s.*); after 2 years from entry, 13*s.* 6*d.*, and thence by annual increments of 6*d.* a day to 19*s.* 6*d.* (previous maximum, 17*s.*); schoolmaster (commissioned officer from warrant rank) on promotion, 20*s.* (19*s.*), thence by annual increments of 6*d.* a day to 25*s.* (same as previous maximum). It is now provided that promotion to the rank of commissioned officer from warrant rank is to be made, if the officer has not already been specially selected for promotion to senior master, after 15 years from entry, instead of 20½ years as formerly, provided that the officer is recommended and qualified by examination. The greatest increase of pay goes to the senior masters (commissioned officers from warrant rank). Formerly they received 19*s.* on promotion, with additions of 2*s.* a day after 3, 6, and 9 years respectively. In future, they will receive pay according to their seniority on the schoolmasters' scale, with an addition of 3*s.* a day. The headmasters (with relative rank of lieutenant) are granted 1*s.* a day increase, their new rates being, on promotion, 28*s.*; after 3 years, 29*s.*; and after 6 years, 30*s.* After 8 years (with relative rank of lieutenant-commander), they will receive 32*s.*, and a new rate, 36*s.*, after 3 years as lieutenant-commander, was introduced. Another important concession was the grant of the rank of commander to 1 per cent. of the schoolmaster branch. Promotion will be by selection, in conjunction with seniority as headmaster, and the rates of pay will be the same as for executive commanders, viz., 40*s.* a day on promotion, with 4*s.* increases after 3, 6, and 9 years.

Promotion.

On January 1, 1922, for the first time for many years, the half-yearly list of naval promotions contained no new commanders, the Admiralty announcing that the promotion of lieutenant-commanders to this rank was postponed owing to the number to be promoted being still under consideration. Eventually, after a settlement with the Treasury had been effected, the list was published on April 1, and dated back to December 31, 1921. It contained twenty names, the same as on July 1, 1921.

The zones for engineer officers' promotions in the new year list were fixed as follows: To engineer-captain, 8–11 years' seniority as engineer-commander inclusive on date of selection, viz., December 31, 1921; and to engineer-commander, 4 years' seniority as engineer lieutenant-commander, and over, on date of selection. In September, the Admiralty gave notice that the zone for promotion to engineer-captain in December, 1922, would be 7–10 years' seniority as engineer-commander inclusive on the date of selection; and the engineer-commander, 4 years' seniority as engineer-lieutenant-commander, and over, on the date of selection.

By an order dated April 28, 1922, naval and marine officers holding appointments as aide-de-camp to a governor-general or governor were allowed to count for all purposes service as such, if the Admiralty think fit, as though it were service in the Royal Navy or Royal Marines, irrespective of whether half-pay is issued from naval funds or not. This decision has retrospective effect to September 25, 1919.

The new rank of ordnance lieutenant (T) was instituted by an Order in Council published in the *London Gazette* on November 11, 1921. The Admiralty, being of opinion that the increased complexity of the electrical and torpedo apparatus employed in H.M. vessels warranted the division of the electrical artificer branch into two, obtained this Order in Council whereby two branches were set up, to receive the pay and conditions of service of the existing electrical artificer branch which they superseded. Hence, instead of an electrical artificer employed on torpedo duties rising, as formerly, to warrant electrician, commissioned electrician, and electrical lieutenant, respectively, he is now eligible for the new grades of warrant ordnance officer (T), commissioned ordnance officer (T), and ordnance lieutenant (T). Similarly, among the ratings, the electrical artificers and chief electrical artificers were separated into two classes, one class retaining these titles and the other class being known as torpedo artificers and chief torpedo artificers. The new order added one more to the list of branches in the Navy, making fifteen altogether, in which men can rise from the lower deck to commissioned rank. Thus a gunner and a boatswain can be promoted to lieutenant; a signal boatswain to signal lieutenant; a telegraphist to telegraphist lieutenant; a member of the regulating branch (late ship's police) to lieutenant-at-arms; a shipwright to shipwright lieutenant; an artificer engineer and a mechanician to engineer lieutenant; an ordnance artificer to ordnance lieutenant; a torpedo artificer to ordnance lieutenant (T); an electrician to electrical lieutenant; a sick berth rating to ward-master lieutenant; a writer to paymaster lieutenant; a victualling rating to paymaster lieutenant (V); and a cook to "lieutenant instructor in cookery."

Mishaps.

There were four mishaps in the Fleet during the year involving loss of life and of vessels. Submarine H42 was rammed by the destroyer Versatile on the morning of March 23, 1922, while exercising off Europa Point, and was lost with all hands in 500 fathoms of water. Lieutenant Douglas C. Sealy, D.S.C., the commanding officer, was Senior Submarine Officer of the Third Flotilla, Atlantic Fleet; 25 other officers and men also perished. The drifter Blue Sky, attached to the Atlantic Fleet Flagship, was lost with all hands, three officers and twelve ratings, in June, 1922. Leaving Portsmouth on the 12th for Invergordon, where she should have arrived on June 17, she was last heard calling Sheerness wireless station at 17.53 on June 13, but no actual message was received, as that station does not receive messages on the wave

length used by naval drifters. On June 18, wreckage was reported to have come ashore at Herne Bay and Margate, and the Nore duty destroyer was sent out to search, but no further trace of the vessel was found. On the night of August 8, the light cruiser Raleigh, flagship of the Commander-in-Chief, North-American Station, went ashore at Point Amour, in the Straits of Belle Isle, off the Labrador coast, and became a total wreck. The crew managed to get ashore, but ten men were missing and presumed to have been killed or drowned. The Raleigh struck while entering Forteau Bay. The Admiral, Sir William Pakenham, was not in her at the time, having transferred his flag to the Calcutta for a visit to Rigoulette. The Raleigh was the first British man-of-war of any size to be lost by ordinary marine hazards since the war. On September 24, the destroyer Speedy came into collision with a Dutch vessel in the Sea of Marmora, and went down in seven minutes. Engineer-Lieutenant G. E. Harmon and nine ratings lost their lives.

The Year's Work.

Although the provision for fuel is now barely sufficient for the needs of the Fleets in regard to war training, it has been found possible for various squadrons to visit Dominion and foreign ports during the year. Mention may be made of the cruise of the Hood and Repulse to Rio to represent this country at the celebration of Brazilian Independence, and their subsequent tour of ports in the West Indies; of the passage through the Panama Canal of the ill-fated Raleigh to Esquimalt, and also her visits to Montreal and Quebec and up the Potomac River to Washington, where the British naval ensign was flown in sight of the Capitol for the first time for a century; and of the voyage of H.R.H. the Prince of Wales to India and Japan in the Renown. The Atlantic Fleet, too, proceeded to the Mediterranean early in the year and carried out a combined exercise with the Mediterranean Fleet in the middle of February.

A feature of the practices carried out by the Atlantic Fleet during the year was a number of mimic attacks from aircraft. Experiments with the various methods of attack from the air were conducted against the obsolete battleship Superb, and the monitor Gorgon. On August 1, 1922, the foreign Naval and Air Attachés, and representatives of the Press, were invited to witness dummy bombing attacks by the Royal Air Force upon the target-ship Agamemnon, which was without a crew and manœuvred by wireless control from the destroyer Truant 3,000 yards astern of her.

Another air exercise, designed rather as a spectacle than as a critical experiment, was that carried out before the King on July 7. His Majesty honoured the Atlantic Fleet by a four days' stay in Torbay from July 4 to 7, during which he inspected several vessels and accompanied the Fleet to sea for exercises. On July 7, in order to afford practice to the torpedo aeroplanes, the Fleet proceeded off the Isle of Wight, approaching to within a few miles of the aircraft base, and the machines were allowed to develop to the full their attack on the big ships. The pilots showed skill and dash in the

handling of their machines, but the conditions, as the Admiralty stated at the time, were so unreal that no practical lessons affecting the security of the Fleet could properly be deduced from the exercises.

The gracious visit of the King, who on leaving expressed his admiration of the appearance of the ships and his gratification at the keenness and wonderful *esprit de corps* displayed, was a fitting termination to the sea career of Admiral Sir Charles Madden, G.C.B., G.C.V.O., K.C.M.G., who hauled down his flag in the Queen Elizabeth on August 15. He had achieved a unique record in modern times in having served continuously afloat as a flag officer for no less than ten and a half years, including the whole of the war. In his message to the Admiral, King George said: "You will have the consolation of turning over to your distinguished successor a Fleet which, I am convinced from my inspection, is in the highest state of efficiency."

Chas. N. Robinson.

P.S.—Since the above was written, threatening movements in the Near East have inspired the Government to reinforce the Fleet in the Mediterranean, and once more the First Battle Squadron of the Atlantic Fleet is represented there, accompanied by a squadron of light cruisers and flotillas of destroyers and submarines. Despite the retrenchment in numbers both of material and personnel which economy has obliged, this sudden call was met with promptitude and smoothness.

CHAPTER II.

Foreign Navies.

Introduction.

Under the terms of the Washington Naval Treaty not only has the strength of the battle fleets of the United States, France, Italy, and Japan been stabilised for a long number of years, but a radical policy of scrapping of capital ships has been agreed to, and the capital ship programmes, on which the United States and Japan were engaged, have been eliminated, except in respect of the Colorado and West Virginia, which were in an advanced stage towards completion in American yards, and the Mutsu, which the Japanese specially desired to complete. France and Italy, as they are already below the tonnage ratio allotted to them, are under no pledge to scrap any of their existing capital ships, none of which is of the Dreadnought type.

The Washington Naval Treaty laid down no tonnage ratios for destroyers or submarines, and, as is recorded below, the United States, Japan, France, and Italy are adding, in varying degrees, to the light forces of their respective fleets, while Germany has laid down a small cruiser at Wilhelmshaven.

In other maritime countries, considerable attention is being devoted to the reorganisation of the naval forces, and it is noticeable that Brazil has secured the services of a United States mission to advise it on matters of policy, while British naval missions are still "lent" to Greece and Chile.

UNITED STATES.

American naval policy is now largely dominated by the need for economy, and that Navy, like every other great Navy, will be profoundly affected by the provisions of the Washington Treaty. It had long been the practice to retain on the list many ships which were becoming obsolete, but when, in 1920, a distinction was made between ships of the first and second lines, a step was taken towards the scrapping policy which has now been adopted. In all, 15 of the old capital ships are to go, but of these the Maine and Missouri had already ceased to be of any effective value. The 5 ships of the "Georgia" class, with 8-in. gun turrets on the 12-in. gun turrets, were already on their way to the "junk pile." The 6 ships of the "Connecticut" class are practically obsolete, and the same is true of the 2 ships of the "Michigan" class. Thus is made up the list of

(*From a drawing by Arthur J. W. Burgess.*)

UNITED STATES BATTLESHIP MARYLAND.

(*For particulars see p. 349 and Plate 37.*)

the 15 old ships, now all out of commission, and not one of which is a Dreadnought or possesses any really effective value. The British Navy has long since scrapped ships of like classes. More effective, as a reduction of fighting strength, is the inclusion on the condemned list of the Washington, of the "West Virginia" class, which was launched in 1920, and is about three parts completed. This is to be done in order to bring down the Navy to the required standard in capital ships. In addition, the 6 battleships of the "South Dakota" class and the 6 battle-cruisers of the "Lexington" class, which promised to lay such a heavy burden upon the taxpayers, will not be carried forward. On October 1, 1921, their mean percentage of advancement towards completion was 28·5, in the case of the battleships, and 15·5 in that of the battle-cruisers. It may be useful to give here the total figures of the appropriations, showing the decrease within three years: 1920–21, $484,406,269; 1921–22, $410,955,973; 1922–23, $289,000,000.

In his last report, as Secretary of the Navy, Mr. Denby said that he had no recommendations to make regarding the naval establishment, but that the expressed policy was to reduce expenditure to the lowest basis consistent with efficiency. Suggestions and criticisms had been invited, and in conformity with recommendations, the New Orleans Naval Station had been closed, and many other changes made. Ultimately, the personnel, especially the enlisted strength, has been seriously affected, and reductions have caused many ships of all classes to go out of commission. At the present time, no part of the naval establishment is stable, nor are the lines of future policy yet definite or fixed, though there is no question of diminishing relatively the effective power of the Navy.

Increase for "Naval Expansion."

The Washington agreements, being concerned only with capital ships, the dimensions of aircraft carriers, the armament of cruisers and some minor matters, will not bring about the almost complete cessation of shipbuilding which in some quarters was expected. When the Senate passed the Naval Appropriation Bill 1922–23, which still fell far short of the original requirements of the Navy Department—with a total of approximately £60,000,000 at par, being about £8,000,000 more than had been allowed by the House of Representatives—it referred specifically to further naval construction, and the development of naval bases in the Pacific, as recommended by its own Naval Committee. In these recommendations some lines of policy are indicated. Among the sums increased was an allowance of about $10,000,000 (£2,222,000) for naval expansion, expressed as judged "to be necessary in the interest of economy, and of the attainment and completion of the plans of new ship construction of various classes of ships contemplated by the arrangement made in the recent Conference on the Limitation of Naval Armaments, and of additional plans of Congress and the Navy Department consonant to the terms of the Limitation Treaty." This statement seems to have had reference chiefly to new submarine

construction alluded to later. The sum appropriated to naval construction has since been increased.

Before going into this matter it may be well to say, with regard to capital ships, and the programme of 1916, that the Maryland has made successful trials; that the West Virginia, third of her class, with a displacement of 32,600 tons, and mounting eight 16-in. guns, was launched on November 19, 1921; and that when the Japanese insisted on the completion and retention of the post-Jutland battleship Mutsu, it was arranged that the United States should complete and retain the Colorado and West Virginia, and that upon these joining the Fleet, the Delaware and North Dakota, completed in 1909, should be scrapped.

New Construction.

Attention was therefore directed primarily by the Naval Secretary and the Senate Naval Committee to the ten light cruisers of the "Omaha" class, which were described in the last "Annual," 1921–22, page 36. These will certainly be completed, there being now an inevitable tendency to turn to the cruiser classes. The Concord was launched on December 15, 1921. The views of the Secretary and the Navy Department were expressed earlier in the year to the House Committee on Naval Affairs. Mr. Denby then said that, theoretically, upon ratification of the Treaty, the existing Navy of the United States would be regarded as the minimum required for national safety. But he insisted that as no limit of construction of ships other than capital ships, except the displacement of aircraft carriers and cruisers, was in the Treaty, it was within the province of the United States Government to consider what should be added to or taken from the Navy, still leaving a fair margin of safety. As the Navy is entirely deficient in fast light cruisers, and as these are provided for in the Treaty, there could be no question that these ships should be completed. The Navy has no battle-cruisers, so that if these ships were not constructed, there would be no vessel in the Navy, other than the destroyer, capable of making even 25 miles an hour. In other words, there would be no scouts. Therefore, said Mr. Denby, the work upon these cruisers would proceed with rapidity. Admiral R. E. Coontz, Chief of Naval Operations, who supported the Secretary's views, was equally emphatic about the continuance of shipbuilding, and also the non-reduction of executive officers.

In relation to the flotillas, some facts concerning the recent classes of destroyers and submarines may be summarised. Fifty destroyers were carried in the Act of August 19, 1916, but the last 15 of these were not authorised until the Act of July 1, 1918. Twelve of them had not been put in hand when the Act of July 9, 1921, was passed, which stopped them by confining expenditure to vessels actually under construction. All the others have been completed. The latest of them displace 1,308 tons, have a speed of 35 knots, and mount four 4-in. guns, one 3-in. A.A. gun, and four 21-in. triple deck tubes. Fourteen of the rather older and yet effective destroyers are now described as light mine-layers.

(From a drawing by Arthur J. W. Burgess.)

ONE OF THE UNITED STATES SCOUT CRUISERS.

(For particulars of these vessels see pp. 352, 353 and Plate 44.)

The first-line submarines comprise 16 of the "O" class, averaging 500–625 tons, 14–11 knots, completed in 1918. The O boats are a product of the war. Many of them were hastily built, but in June a division of them made a cruise of 5,000 miles to the West Indies and back with scarcely any engine trouble or hull defect. The other boats are 27 of the "R" class, 560–680 tons, 13·5–10·5 knots, completed in 1919; and 50 of the "S" class, approximating 900–1,126 tons, with speed not indicated.* Probably 30 of the latter class have yet to be completed. Of the Fleet submarines, 12 are in the list, but 6 were in abeyance owing to the action of Congress in July, 1921. Three of the "T" class have been completed by the Fore River Company, and the first three of the "V" class are in hand at the Portsmouth Navy Yard. Descriptions are not available, but it is said that some of them have a submerged displacement of 2,025 tons, length of 300 ft., and surface speed of 21 knots and submerged of 10 knots, and that they will carry a 5-in. A.A. gun, besides having storage for 16 torpedoes. Propulsion will be by means of a combination of oil and electric motors. A range of 10,000 miles has been ascribed to these boats. The action of Congress in retarding submarine construction seems to have been reversed, for it was stated in the House Committee on Naval Affairs in February, 1922, that orders had been given for the prompt construction of 111 submarines, and that in 1923 the Navy hoped to have 120 submarines capable of accompanying fleets at sea. It was stated in the House of Commons on February 9, 1922, that the United States submarines had an aggregate displacement of 94,600 tons, including 40,808 tons building.

Naval Bases.

On the question of naval bases, the Senate Committee took a very decided line which is receiving effect. The restricted amount of money that could be voted, made it impossible to accede to the demand of the Navy Department for a new destroyer base at San Pedro, California, a base for the Fleet at Alameda, California, or a new naval aviation base at Sand Point, Washington. But the importance now attributed to the Fleet in the Pacific made it necessary to provide adequate bases. Accordingly the Committee approved increases totalling $687,500 (£152,700) for the Puget Sound and Pearl Harbour (Hawaii) bases, which were referred to as "the only naval bases which the United States has on the Pacific capable of receiving and accommodating our largest armed and equipped battleships." In the final Act there were several increases for Pearl Harbour, especially for storage, and the air station. And since the Limitation Treaty prevented the development of bases further west, the report added that these stations became of increased importance. "The main Fleet of the Navy is now stationed in the Pacific, and it is necessary for its maintenance that there should be deep-water bases at which it can find shelter, supply, repair, and equipment." These

* S5 foundered by a nose dive between Boston and Baltimore, September 1, 1920, but no lives were lost owing to the excellent judgment of the commander and the co-operation of the crew. Salvage operations had to be abandoned.

views gained the support of the Senate in its adoption of the Appropriation Account.

As to naval aviation, the Committee declared that the absolute importance of the air service as a branch of naval warfare had been demonstrated. All idea of establishing an independent air service, as in Great Britain, has been abandoned. The sum of $14,703,000 (£3,267,000) was allowed to the Navy for aviation, and the report pointed out that with $15,000,000 elsewhere allowed for army aviation, this gave a total for both services of $29,703,000, as compared with aviation budgets of $66,424,000 for Great Britain, $44,600,000 for France, and $18,723,000 for Japan. Some account of the naval bases with regard to the distribution of the Fleet is given later.

Personnel.

The question of the personnel obviously goes to the root of naval policy, and, accordingly, the Secretary pointed out that it was useless to build ships or vessels unless they were properly officered and manned, and provided with necessities for navigation and training. If the Government could not afford the ships and guns and the men which the experts said were needed to carry out the policy, then he insisted that the Government should change its policy and enable the executive to make a fresh start. A proposal made to the House of Representatives drastically to reduce the enlisted personnel was defeated. The Secretary insisted most strongly that the very last thing to do was to reduce the number of line—that is of executive—officers. To do so would be disastrous, and he indicated as the proper line to take, first, to economise on the shore stations, and then on the Fleet. In the reduction of commissioned personnel, if it became necessary, he declared, he would begin with staff officers, because, in his opinion, in the event of a war it would be easier to secure those officers from civil life than to find executive officers, who should only be reduced as a last resort.

In a statement made in February, Mr. Denby explained his views in detail. He said that then there were in the Navy, in full or in part commission, or in reserve, 18 battleships with total complements of 802 commissioned officers and 18,259 men; 23 cruisers, with 237 officers and 5,438 men; 278 destroyers, with 962 officers and 17,542 men; 101 submarines, with 185 officers and 2,422 men; and 356 auxiliary craft ranging from troopships and supply vessels down to sub-chasers, 878 officers and 26,206 men; while ashore, at stations of every kind, Navy yards, factories, supply depôts, recruiting stations, wireless and communication stations and all other shore establishments, there were 2,917 officers and 28,800 men. The figures were approximate. The battleships had about 84 per cent. complement; the cruisers, 100 per cent.; destroyers, 80 per cent. to 50 per cent.; submarines, 100 per cent. to 40 per cent. It was clear, said the Secretary, that the Navy in enlisted personnel was undermanned. The total personnel then consisted of 6,129 commissioned officers and 96,300 enlisted men. The proposal put forward was to place out of commission 100 destroyers, thereby

releasing 6,400 men, and by economies in the personnel at shore stations and in small craft to release another 3,600, making altogether 10,000, and in consideration of these savings he proposed to ask for 90,000 enlisted men and 6,000 apprentices for the financial year 1922–23, assuming that the Naval Treaty became law. With regard to this matter of the personnel, it may be recalled that last year the Chief of Operations affirmed the necessity of providing 120,000 enlisted men (which he said would make available for sea-going vessels, only 80,000 men) with 24,000 marines additional, giving 144,000 in all, and this figure was approved by the Secretary. The total numbers voted to July, 1922, were, however, 139,000, which figure it was proposed to reduce under the Washington agreements to 115,000. The new Naval Appropriation Act makes a further reduction, and allows a total of 86,000 and 19,500 marines.

No Decrease of Officers.

But, on the whole, the Appropriation Act has been regarded, especially by the officers, as very satisfactory. The establishment of officers is not touched, and provision is made for all the newly-commissioned midshipmen. A strong effort was made to have the number of officers based on the strength of 86,000 men, instead of upon what is regarded as the statutory complement of 137,000, but this was defeated in the committee which adjusted the differences between the two Houses, and every request made by Rear-Admiral Washington, Chief of the Bureau of Navigation (really of the Personnel), was granted. He advocates that the whole subject of the future of executive officers shall be seriously investigated. A favourable sign for officers is that the numbers selected for promotion have been increased. The older officers promoted from warrant rank have found some difficulty in obtaining permission to retire, but this is now being granted. All the temporary appointments were abolished on December 31, and thus the situation is returning to the normal. In view of the restricted provision made for fuel for steaming and other purposes, the number of enlisted men—86,000—will no doubt prove sufficient. For fuel only $16,000,000 is allowed in the Appropriation Act, the Senate having failed to augment the sum. About 2,500 excess petty officers are about to be transferred to the new Fleet Reserve.

As a result of the reduction in the number of enlisted men to supply the demands of the Fleets and flotillas a special regulation of complements has been introduced. None of the ships have now their full complements (which are normally much higher than in the British Navy), though in the Atlantic and Pacific Fleets and their active flotillas and auxiliaries, they may not fall far below their establishments, and they have all their specialist officers on board. In the active destroyer flotillas of the Atlantic and Pacific Fleets, the strength is 84 per cent. of the full total. The ships and destroyers in reserve have but half complements, and when ships are undergoing long refits, they are placed in the category known as "ordinary," in which they have from 8 to 12 per cent. of their

full complements. Ships which are not in commission have no naval complements, but are in charge of caretakers, though frequently surveyed and examined. It is uncertain whether further reductions of ships in commission or reductions of complements will be necessary, but already large numbers of destroyers have been placed in one or other of the non-active categories, and the flotillas, or, as they are called, squadrons, actually operating severally with the Atlantic and Pacific Fleets have been reduced.

With regard to the work of the American Marines, it may be of interest to record that they are largely engaged in extending the work of the Navy on shore. Considerable numbers of them are now at Haiti, Santo Domingo, and Nicaragua, and a proposal to withdraw them was defeated in the Senate in June.

Atlantic Fleet and Bases.

The Fleets are organised upon a complete, though now in some respects a skeleton, basis. The Flagship of the combined Fleets, the new battleship Maryland, is with the Atlantic Fleet, which consists of the Third Battle Squadron. Only one of its divisions, comprising four battleships, is in full commission, the two other divisions, each of two ships, being in reserve under the flag of the Coast Defence Force. Attached to the Fleet was an Operative Squadron of three divisions of the most modern destroyers (84 per cent. complements), being eighteen boats in all, with a squadron leader, another squadron of the same strength, and three incomplete. All the divisions have been trained as tactical units, but their numbers have since been reduced, and the divisions have now only 5 or 6 boats and some of them are skeleton formations. When the scheme of reorganisation is complete, the Atlantic Fleet is intended to have two squadrons of destroyers, of 18 boats each, and each with a flotilla leader. Belonging to the Fleet are some additional squadrons, all in reserve. There is also an air detachment, the aircraft carrier Wright transporting some 6 boat seaplanes, and 2 mine-sweepers are attached as tenders; also there are submarine divisions based on Coco Solo in the Canal Zone, New London and Hampton Roads, and a Mining Force of destroyers fitted as mine-layers. The Atlantic Fleet has likewise an efficient squadron or division, with a cruiser flagship, of repair, supply, fuel, and hospital ships, and other auxiliaries. Shortage of men and reduction of fuel allowance have already caused 50 destroyers and 51 auxiliary vessels to be put, possibly only temporarily, out of commission. Within the outlook of the Atlantic, but entirely detached, are the ships in European Waters, which it is now announced will include eight modern destroyers.

The Atlantic Fleet organisation includes nine naval districts on the coasts and the Great Lakes and in the West India Islands, each of them with Eagle boats, a submarine and chasers. The naval airship stations are at Hampton Roads, Pensacola (Florida), and Coco Solo, the reserve station at Chatham, Mass. There have been usually 10 airships in commission, in addition to 8 Army

airships, located near Hampton, Va., San Antonio, Texas, and El Paso. Coast stations, each with a number of boat seaplanes, are at Hampton Roads, Pensacola (training), and Coco Solo. Other stations have been closed.

The Pacific.

The principal naval force is in the Pacific, where the Battle Fleet comprises in all 12 battleships, including the Fleet and squadron flagships. The organisation of the destroyer and submarine and air establishments is still in progress, and larger forces may be sent to the Philippines. Attached to the Fleet is an operative squadron of 18 modern destroyers, with a leader, and there are 5 other squadrons in reserve, each with a leader, and a total of 80 boats, most of them located at San Diego. There are also an air squadron and a mining squadron of 10 destroyers. The Fleet Submarine Force recently comprised a depôt ship and 10 boats of the "R" class. The situation in the Pacific is highly interesting and important, but it is impossible to forecast developments. Recently a flotilla leader and 12 modern destroyers have proceeded to the station by the Suez Canal route, relieving 12 older destroyers, which will return. It is known that a submarine base has been formed at Cavite in the Philippines, and it was rumoured that the S boats, which are now at Pearl Harbour, Hawaii, or some of them, would be advanced, with their depôt ship to that station, their places at Pearl Harbour being taken by others of the S boats. If additional destroyers and submarines proceed to the Philippines, they will doubtless be accompanied by naval aircraft, of which a considerable number are at Hawaii. The Fleet air squadron, which has the Aroostook as its mother ship, and numbers about 30 'planes, and the station at San Diego, California, are to be greatly strengthened. Battleships will not cross the Pacific, but everything goes to show that the American flotillas are likely to be progressively strengthened in the Philippines.

The other Pacific station is San Pedro, California, where there are usually 15 or 20 of the "F" "L" and "H" classes of submarines. Pearl Harbour has at present about 25 submarines of the most modern classes, S and R, both of which are capable of accompanying a Fleet. There are also a mining division of six recent destroyers and two flotillas of sweepers. The Pacific Fleet has a whole array of auxiliary and supply ships, though some of them may now be out of commission. Pacific bases, additional to those already named, are at San Francisco, in the Canal Zone, and at Bremerton, the latter being a district command that carries its reach up to Alaska. The naval airship station is at the important base of San Diego, where there is also a seaplane training establishment.

At many of the naval stations are Eagle patrol boats usually acting as tenders. Of this class there were about 60, but more than half of them appear to have been sold. Of the submarine chasers, of which there were originally 341, 71 remained in June, 1921, and have now probably all been sold.

Aeronautical Research.

Reference has been made above to the views of the Senate Committee on naval aviation. The amount set down in the Naval Appropriation Act for the flying service is equivalent to £3,250,000, and in 1923 the Navy will have 86 fighting aeroplanes, while 250 various 'planes are proposed. This branch of the service has made great advances in scientific and practical training since the institution of the Bureau of Aeronautics in the Naval Department on September 1, 1921. An air force was then organised for each fleet, comprising scouting, spotting, contact, torpedo, and bombing and kite-balloon squadrons. Officers attached to the Bureau, of which Rear-Admiral W. A. Moffett is chief, have been successful with a system of launching of seaplanes, carrying a pilot and passenger, by means of a catapult from on board ship. This has been practised from the deck of the Maryland. This catapult, perfected and tried at Yorktown, Va., is a development from previous devices.

The catapulting of 'planes from a ship was first effected in 1915, on board the North Carolina, followed in 1916 by further experiments in the Huntington. The equipment was cumbersome and not sufficiently powerful to suit the needs of fighting ships and modern high-speed 'planes. Consequently, efforts were made to produce a more compact and powerful mechanism which would enable protective and observation aircraft to be launched successfully from ships at sea. Such was the demand for patrol and other seaplanes that it was not until the spring that the work was started. This device, it is claimed, gives the United States superiority over every other Navy in the world, in that none of them is in possession of an effective mechanism of this sort. It is hoped to equip every vessel of the battle fleet with a catapult and fighting 'planes. The Nevada has since been fitted with the apparatus.

The Chief of the Bureau has reported that the value of aircraft in observing and reporting the fall of shot has been demonstrated, as also has been the value of training against aircraft. Photography has been highly developed by the Naval Air Service, and recently the delta of the Mississippi was surveyed from the air.

In addition to the already very large number of auxiliary vessels belonging to the United States Navy, 2 transports have been taken over from the War Department, and from the Shipping Board 24 ships intended to serve as oilers, storeships, tenders, cargo vessels, and in other capacities.

JAPAN.

The Treaty of Washington has left Japan where she stood as one of the three Great Naval Powers of the world. Financial retrenchment was imposed upon her. Outlay upon great armaments was pressing heavily upon the requirements of education and other services. In the actual number of ships to be retained by Japan, as set forth in Chapter II. of the Treaty, she appears to be the equal

of France and Italy, but in the displacement and power of her ships, and in her allotted displacement tonnage—315,000—she is markedly their superior. This superiority, it is claimed, implies no direct menace to any Power. Aggressive purposes were attributed to Japan in statements in the press in April, but the Japanese Government issued an official denial, and declared that the Navy would not only loyally observe the Washington Treaties, but would conform whole-heartedly to the spirit of the Conference, as had already been declared in the Diet by Admiral Tomosaburo Kato, Japanese representative at Washington, and now both Prime Minister and Minister of Marine. There has, in fact, been general satisfaction with the Naval Treaty in Japan, and it was approved by the Marshals' and Admirals' Council which met soon after Admiral Kato had returned from Washington.

The Naval Problem Simplified.

The Japanese naval problem has been simplified. The strategic situation of the country is now stronger than before, owing to the restriction of foreign approaches by the prohibition of further fortification, and the agreement against the provision of naval bases east of the meridian of 110° E. longitude. The Japanese Fleet will now be based wholly on the Japanese Islands, with ample docking, refitting, and supplying bases close at hand. It will control all the entrance channels to the Sea of Japan. Japanese bases flank the openings to the Yellow Sea, and Formosa and the Loo Choo Islands, which are potential bases of flotillas, lie athwart the approaches. Japan, moreover, is not within striking distance of any powerful squadrons. The distances are too great. The only serious problem is that of supplies. The country is now largely dependent on the import of food-stuffs and raw material, but in many cases the sources from which necessary imports come do not lie beyond great stretches of ocean. Iron ore is perhaps the greatest difficulty. The terminals of important lines of supply are in China, and, though Japan declares that she will seek no quarrel with that country, in case of war she will undoubtedly know how to deal with its resources.

The Japanese did not lose time in taking steps judged necessary to give effect to the Treaties. The naval and military staffs considered the question, and many retrenchments were made. Upon the advice of the Council of Marshals and Admirals, what appears to be a policy of greater concentration was entered upon. At the close of 1921, the Fleet in commission was reorganised and reduced. The personnel was soon touched, and as an index of what took place, it may be mentioned that about ten rear-admirals were retired. Many other problems arose. When the work on the new battleships and battle-cruisers was stopped, a new situation was created in the dockyards. It appears to have been decided that a proportion of the men should be employed in breaking up old ships. Whether this was done is not known, but in this country there has been a good deal of opposition to setting men to break up ships, whose true business is to build and fit them for service.

The New Building Programme.

Much more likely is it that the Japanese will now direct attention to, and employ labour in, the building of vessels and aircraft which lie outside the provisions of Washington, and are necessary for the defence of commerce and supplies afloat. They will further increase the number of their cruisers, destroyers, submarines, and aircraft. The new programme includes 8 additional light cruisers not exceeding 10,000 tons standard displacement, 24 first-class destroyers, and, it is believed, 28 submarines. The exact situation of the flotillas is unknown, but it was stated in the House of Commons in February, 1922, that the Japanese then had submarines with a gross displacement of 10,054 tons, and that submarines were building which would displace in the aggregate 22,165 tons. Not much information is available concerning the naval flying service. The seaplane carrier is the Wakamiya, and another, specially built for the duties, the Hosho, must now be complete or on the point of completion. Two of the disallowed battle-cruisers are intended to be converted. The naval air service is principally based on Yokosuka and Oihama, and recently about 70 various 'planes were attached to these stations.

Reference has been made above to the reduced number of ships in commission. The two battle squadrons of the First Fleet were left with 3 battleships each—the new and powerful Mutsu and Nagato and the Ise in one squadron, and the Kongo, Hiyei, and Kirishima in the other. Four vessels remained in the Cruiser Squadron, with the Kiso as flagship, and 9 destroyers and a leader in the Torpedo Flotilla. The Second Fleet was reduced to the two older battleships Aki and Satsuma, which, as is shown below, are both on the condemned list, and attached to them was the coast-defence vessel Iwami, which was recently at Vladivostok. The other ships and vessels of all classes were sent to their ports, partly for manning purposes, and were stationed chiefly at Yokosuka, Kure, Sasebo and Maizuru, which last-named port has been reduced to a second-class base, as also has Chinkai in Korea. A small squadron was in the Yangtze. Port Arthur is to become a purely commercial harbour, and Takeshiki and Yeiko in Korea have been closed. These and other changes have been made in order to curtail expenditure which was crippling the productive and other work of the country.

The Battle Fleet.

Recurring to the capital ships, it must be recorded that the insistence of the Japanese on the completion and retention of the battleship Mutsu affected the decisions of the Washington Conference, with the result that the Americans have been authorised to complete two ships of the "West Virginia" class. The attitude of the Japanese naval authorities on this question is quite comprehensible and was almost inevitable, in view of the partial obsolescence of some of the ships left to them. These are—in addition to the Mutsu and Nagato—the Hiyuga, Ise, Yamashiro, Fuso, Kirishima, Haruna, Hiyei, and Kongo. The 7 battleships and 3 battle-

(From a drawing by Arthur J. W. Burgess.)

JAPANESE BATTLESHIP NAGATO.

(For particulars see p. 339 and Plate 28.)

cruisers which Japan will scrap in pursuance of the Treaty are not of any real value. Not one of them is a Dreadnought. It had already been decided to scrap the Settsu; the Hizen is an old Russian ship; the Mikasa, repaired after the disastrous explosion on board, is now out of date; the same is true of the condemned Kashima, Katori, and Satsuma. The battle-cruisers to be scrapped are the Ikoma, Ibuki, and Kurama, which date from 1908–10, and are classified as battle-cruisers only because they displace over 10,000 tons and have 12-in. guns. Hitherto they have usually been described as armoured cruisers. When these 10 ships have been removed from the list, Japan will not be called upon to scrap any others until 1934. The ships which will not be completed are the battleships Kaga (launched November 17, 1921) and Tosa, and the battle-cruisers Amagi, Akagi (these two to be converted into aircraft carriers), Takao, and Atago. The further programme of 8 ships (Kii, Owari and others) will not be taken in hand.

The old light cruiser Niitaka was lost in a typhoon off Kamchatka, on August 26, 1922, with about 600 officers and men.

FRANCE.

An important reorganisation of the French high command has taken place under the provisions of a decree of December 27, 1921. The object is further to co-ordinate the working of the naval forces. The Vice-Admiral, who in peace is Chief of the Naval General Staff and who presides over the Superior Council of the Navy, will, in case of war, assume command of all the forces afloat, and, in his staff duties, will be succeeded by an officer who is to be nominated in time of peace. In the same way two Vice-Admirals are to be appointed who, on the outbreak of war, will assume command, one in the North Sea, Channel, and Atlantic, and the other in the Mediterranean. During peace they will act as Inspectors-General of the forces they will command in war. Four Vice-Admirals have been appointed to command the Frontières Maritimes, which are referred to below, and on the outbreak of war they will come directly under the orders of the Commanders-in-Chief in the theatres of operations. It is provided that the Naval Forces, which are under the orders of the Ministry of Marine, will in time of war be under the authority of the Commanders-in-Chief in the Seas in which they operate. In consequence of these changes the Naval Prefects cease to be Commanders-in-Chief, but act under the Minister of Marine in all matters which concern the rear services.

The outlook of the French Navy at the present time is very uncertain. At the moment of writing, the Washington Naval Limitation Treaty has not been ratified, though there is no reason to suppose that France will either withhold her adhesion or make such reservations as may deprive the Treaty of its intended effect. The new Minister of Marine, M. Raiberti, told the Naval Committee of the Chamber in February, 1922, that as France had arrested naval

construction in 1914, she was actually eight years ahead of other nations in the matter of naval disarmament, and added that he hoped to shape his policy in accordance with the spirit of the Washington agreements. But this statement applied only to capital ships. The French Navy is not so immediately affected by the Treaty as are the British and United States Navies. It is not called upon to scrap any ships until 1930. France has expressly reserved the right to allot the capital ship tonnage which is assigned to her as she may consider advisable. She can thus dispose of 35,000 tons in each of the years 1927 and 1929. The loss of the battleship France, at the entrance to Quiberon Bay, August 25, alters the situation, and it has been proposed to complete the Normandie or Flandre to replace her—25,230 tons, 12–13·4 in. guns.

France's "Hands Free."

When the Senate on March 17 adopted the Navy Votes of 1922, as passed by the Chamber, the Minister, in the course of the debate, made an explicit declaration with reference to naval construction. He said that nothing in the agreements set any limit on the construction of light vessels and submarines, which statement was in conformity with the line adopted by the French Naval Delegation at Washington. At the Conference, the British Delegates had been prepared to renounce submarine warfare altogether, but this suggested policy had secured little support, and the French were very strongly opposed to any such limitation. M. de Kerguezec, president of the Naval Committee of the Senate, expressed great satisfaction, in the debate referred to above, that no limitation had been set on the building of submarines, and declared, without dissent from the Minister, that French Naval policy would not be changed. "It is necessary for France to have her hands free to carry out a foreign policy suitable to her greatness and her dignity. . . . We must not abandon our destinies to anybody, not even to our dearest allies."

But it must be placed upon record here that the French Minister of Marine, expressing French naval policy and supported by M. de Kerguezec, definitely declared, before the Senate, March 17, 1922, that the submarine fleet must "act in conformity with the law of honour and humanity." A certain controversy had arisen on this matter at Washington and in the British and French press. Captain Castex, lecturer at the Ecole Supérieure, was alleged, in certain articles published in the *Revue Maritime* in 1920, which subsequently appeared in a volume entitled "Synthèse de la Guerre sous-marine de Pontchartrain à Tirpitz," to have given approval to the methods of German submarine warfare. The only point arising from the controversy needing to be recorded here, as perhaps indicating some line of possible future strategy, is embodied in Captain Castex's statement or view given in the following words: "Engaged in a formidable conflict, from the result of which she hoped to gain the mastery of the world . . . seeing it turn against her, and understanding rapidly that her existence was at stake, it was the duty of Germany, in her own cause, to use every means, and to require the

submarine weapon to do the maximum of harm to the enemy; she could not neglect it on pain of making so grave a blunder as to lose her the war."

Navy Votes and Programme.

On March 17, 1922, the provisional shipbuilding programme, as passed by the Chamber, was adopted by the Senate, and it was announced that the construction of the five battleships of the "Normandie" class, laid down in 1912 and 1913, and some of them well advanced towards completion, had been definitely abandoned. In June, the Navy Estimates for 1923, which are to give effect to the programme, were laid before the Chamber accompanied by an explanatory memorandum. The total sum is 1,121,000,000 fr. (£44,340,000 at par), as compared with 797,000,000 fr. (£31,880,000) in 1922, being an increase of 324,000,000 fr. (£12,960,000). The ministerial note claimed that the increase results solely from the charges for the new shipbuilding programme. In 1922, 160,000,000 fr. were assigned to this purpose, whereas in 1923 the shipbuilding vote will be 334,000,000 fr. (£13,200,000), to be followed by 190,000,000 fr. in 1924, and 76,000,000 fr. in 1925. The total cost of the four years' programme will thus be 755,000,000 fr. (£30,200,000 at par).

The programme comprises 3 light cruisers of 8,000 tons, six 35-knot flotilla leaders of 2,400 tons, 12 destroyers of 1,400 tons, 12 submarines, and 1 aeroplane carrier, being the uncompleted battleship Béarn converted. These vessels are part of a larger scheme, which includes 3 other cruisers, 6 flotilla leaders, and 24 additional submarines. The estimated cost of each vessel is not known. The moneys voted for the ships of the "Normandie" class, and not expended, will be devoted to the vessels of the new programme. It is possible that the exact allocation of the money may be varied between one year and another, and, by delaying one or other of the cruisers or flotilla leaders, a larger proportion of submarines could be put in hand, but there is nothing to show that this is contemplated. In the House of Commons on February 9, 1922, it was stated that France possessed submarines aggregating to 30,873 tons, and that none was under construction. It should be noted that the ex-German submarines have been refitted for service. In the March debate in the Senate, M. de Kerguezec expressed the view that 90,000 tons of submarine construction would be altogether insufficient for France, though there appears to be no present intention of reaching that standard, which, it may be observed, exceeds the tonnage of Great Britain and approaches that of the United States.

Although naval construction has been retarded, the French Navy has acquired two or more Thornycroft hydroplanes. The second of them attained a speed of 41·6 knots. She was specially constructed to face heavy weather and carries the formidable armament of two 18-in. torpedoes, 4 machine guns, and 2 depth charges.

With regard to the finance of the shipbuilding programme, as outlined above, and the general cost of the Navy, the Minister admits that the reductions in the estimates—excluding the cost of naval

construction—are inconsiderable, but points out that recent navy estimates have been severely restricted by the Chambers. It is possible that even the small reduction proposed will not be made unless the closing of the Rochefort dockyard and of the establishment at Guérigny, be begun in 1922, and unless the Saigon yard be handed over to the Department of the Colonies. It appears to have been decided not to close the dockyard at Lorient, but it will be reduced, the shipbuilding plant and berths being retained. There was a possibility of the opposition of local interests at Rochefort and Guérigny defeating the purpose of the Ministry of Marine. The naval authorities are not responsible for money being wasted on establishments which have lost their value, and therefore, on the advice of the Superior Council of the Navy and the General Staff, a *projet de loi* has been presented for the closing of Rochefort and Guérigny, and for the reduction of Lorient.

Personnel.

There are very few reductions in the personnel of the Navy, the total effective of 55,000 men being maintained, including the naval air service and coast defence. The proposal for fixing the number of officers has not yet been submitted to the Chamber. At present there are 15 vice-admirals, 30 rear-admirals, 115 captains, 215 commanders, and a large number of lieutenants and junior officers, but these numbers are not kept up, and many officers have retired or sought other employment owing to the prevailing uncertainty, and thus reduction is taking place progressively towards the establishment contemplated. Young officers are appointed at the Naval School between the ages of 17 and 19. Considerable dissatisfaction has been expressed in the French press at the high figure of the civil personnel of the Navy, which stands at 36,559. A decree of April 28, 1922, authorised a reduction of 4,917, which is considered insufficient and this will not be accomplished if the closing of the establishments at Rochefort and Guérigny be not begun, and the yard at Saigon be not transferred to the Colonies. The cost of administration and maintenance has also been severely criticised.

Naval Flying Service.

There appears to be no intention of severing the essential flying service from the Navy; but this is no longer attached to the General Staff, being autonomous in the same way as are the departments of new construction and ordnance. The cost is not yet considerable, and at a general inquiry in June, 1922, the Minister of Marine said the votes were quite insufficient. Of the total of 512,000,000 fr. (over £20,000,000 at par) allotted to naval aviation in the years 1917–22, 300,000,000 fr. referred to the purchase of material during the war, while the remainder represented the cost of the existing material and of the maintenance of the 19 flying stations which alone have been retained of the 58 created during the war. The

vote in 1922 was 37,000,000 fr. (£1,480,000 at par). With such restricted supplies, said the minister, the most urgent thing was to complete those bases which will become the ports of naval aviation. He gave high praise to the successful trials and experiments conducted under the direction of the Commander-in-Chief in the Mediterranean, by Lieut. Teste, with the two escadrilles of the Mediterranean Squadron and the assistance of the Commission of Aeronautical Study.

There are three aviation centres for the Navy—at Saint Raphael (Var) near Toulon, on the Etang de Berre (Bouches du Rhône) and at Hourtin (Gironde). In addition, a non-rigid and a rigid airship are at the school at Rochefort. The Béarn will be converted to a seaplane carrier at La Seyne, and the personnel to be embarked and the 'planes are now at Saint Raphael. At the naval ports and principal trading ports are aeroplane stations, and the airship schools are at Rochefort and Cuers, near Toulon. There are also aviation stations in Algeria, Tunis, and Morocco.

Coast Defences.

The coast defences have now been assigned definitely to the Navy. Formerly they were under the Ministry of War. At the outbreak of the war the change was made hastily, with some unsatisfactory consequences, for, while young seamen were left on the Côte d'Azur with no call on their activities, old territorials were fighting in the hard struggle on the front at Verdun. Marshal Pétain recognised the necessity of the arrangement now made effective, it being evident that, in case of another war, the Army will have enough to do on the land fronts without also having responsibility for the coast defences. The Army is agreed on that point. The old theory was that the functions of the Navy ended at the high-water mark. The transfer was finally made by decree on December 27, 1921, and the naval organisation was announced on June 7, 1922, the Navy being now responsible for what are known as the "Frontières Maritimes." The coast guns are manned by naval gunners, and it is expected that the defences will be made effective by mounting some of the 13·4-in. guns intended for the battleships which are not to be completed, and the 11·8-in. guns of the ships struck off the lists. The other elements of the defence are flotillas of destroyers and submarines, groups of mine-sweepers and swift vedette boats or launches, mine-layers, dirigibles, aeroplanes, and hydroplanes, and fixed defences of mines or automobile torpedoes. The arrangement is generally approved, but some critics think too much money may be devoted to local defence, while the real business of the Navy is to navigate. There are to be four of the Frontières Maritimes, giving appointments to four vice-admirals and four rear-admirals, and the total number of defence sectors will be 21, each under the direction of a flag or other senior officer.

ITALY.

The Italian Navy is at the present time undergoing slow but progressive changes. In the view of the Washington Conference, embodied in the Treaty, Italy is the equal of France, and is assigned the same replacement tonnage in capital ships. Her responsibilities and dangers are at least as great, for she is vulnerable from the sea, and many of her territorial and commercial interests lie beyond and across the sea. Austria-Hungary, her great rival, disappeared, but there are new nationalities in the Mediterranean regions, as yet unsettled and uncertain, and any disturbance in those waters or in the countries beyond them would exercise a profound influence upon the fortunes of Italy. Economy was a vital necessity to her, and her rulers acted wisely in maintaining the three great dockyards and bases, well distributed strategically, Spezia, Taranto, and Pola, and in reducing all the others. Further progress has been made in that direction, under royal decree. The "arsenals" of Venice and Naples and the shipbuilding yard at La Maddalena now become "naval bases," each of them a *base navale*, not in the sense in which that expression is generally used, but in the sense of being available and useful to the Fleet, while, under special arrangements, they, as well as Brindisi, are open to the mercantile marine, and their docks, buildings, and resources, when exceeding the requirements of the Navy, may be allowed to private uses under dispositions to be made by the Under-Secretary for the mercantile marine, and the Minister of Finance. For naval uses they will remain capable of refitting ships and vessels, using local resources and having proper stores, and they will be the homes of some of the light forces and probably of some of the flotillas. A naval officer will have charge of all that concerns guns, torpedoes, and mines, and there will be technical officers concerned with engineering and like matters. At each of these "bases" a rear-admiral or captain will exercise command.

Influence of the Washington Treaty.

These arrangements are, of course, impelled by motives of economy. As to the larger question of the Fleet, it is manifest that no heroic policy can be embarked upon. Energy seems to be devoted chiefly to the flotillas and to the naval flying service. Details are not given in the estimates of 1922–23, but it is stated in the official memorandum that new construction will be confined to the replacement of light vessels lost or damaged during the war period. The replacement tonnage allotted to Italy is 175,000, but the actual aggregate displacement of the capital ships of the Navy does not now reach that figure, though it is not so far inferior as to permit of the immediate construction of battleships, if such were designed to be built. By an arrangement that has been made in order to maintain something like the right establishment, the four small battleships of the "Roma" class, which are really out of date, and which the Minister had been empowered to sell, are to be

retained temporarily. The Leonardo da Vinci, which, as the result of an explosion, sank keel uppermost at Taranto, and was righted and towed into port, a veritable engineering triumph, is also being repaired and refitted for service. The Navy, in these circumstances, is not now directly affected by the Washington Treaty, because, under the provisions, no capital ships are required to be scrapped until 1931. Italy has expressly reserved the right to employ the capital ship tonnage allowed to her in such ways as she may think best, always provided that the ships do not exceed the prescribed limitations of size. It would be within her discretion, under the rules, to build ships to a displacement of 35,000 tons in 1927, again in 1929, and again in 1931. If she should dispose of the four ships of the "Roma" class it would be competent also to the Government ultimately to add their aggregate tonnage of 50,400 to the available tonnage which will also be at disposal. But retrenchment is the order of the day, and we cannot forecast the future policy of Italy in battleship construction.

As to the flotillas, it was stated in the House of Commons on February 9, that she possessed submarines of a gross displacement of 17,641 tons, and was building others with a total displacement of 2,616 tons. The submarines now number 42, and of these 10 are of the cruising class. To the latter four will shortly be added. Considerable additions have been made to the destroyer lists. Six of a large and powerful class, 930 tons, 32 knots, have been completed at the Orlando yard, Leghorn, and two are completing. Odero, at Sestri Ponente, has completed four rather smaller, but of the same speed, of the "La Masa" class, named after Generals who distinguished themselves in the war, and six more are building. Thus 18 new and powerful boats are being added, and the flotilla is strengthened by adding to it 3 destroyers, 1,012 tons, 32 knots, and 1,254 tons, 37·5 knots, which have hitherto been accounted as scouts.

Reclassification of the Fleet.

The Fleet has been reclassified. There are two classes of battleships, the second class being inferior to 18,000 tons displacement, including therefore the 4 ships of the "Roma" class temporarily retained. Other battleships, no longer sea-going, are assigned to coast defence. Cruisers are vessels of 6,000 tons or more, and scouts have lesser displacement, but if they displace less than 3,000 tons they are denominated light scouts. The whole of the destroyer and torpedo-boat classes are known as *siluranti*, but the largest class, 1,500 to 500 tons, still bear the Italian rendering of the old name of torpedo-catchers. They include the three powerful boats Alessandro Poerio, Cesare Rossarol (ex-German), and Gulielmo Pepe, which are referred to above. Smaller classes are described as torpedo-boats. The smallest of all, averaging 110 tons, are being largely increased. The numbered list, with a few missing, now extends to 79. Of the submarines, those with a surface displacement of over 500 tons are now known as of the cruising class. The M.A.S. (*motoscafi anti-sommergibili*) boats or launches, with internal-combustion

engines, specially designed for anti-submarine action, and carrying small torpedoes, are in a class to themselves.

The Italian Navy has its own independent air service to which, in 1922–23, a sum of 7,750,000 lire is allotted. The headquarter commands are, for the Upper Tyrhenian Sea at Spezia, and for the Lower Tyrhenian at Naples; for the Upper Adriatic at Pola, and for the Lower Adriatic and the Ionian Sea at Taranto. Each command has its seaplane stations, and there is a school for seaplane pilots at Taranto.

Considerable reductions were made in the personnel in 1919 and 1920; but in 1921 the establishment remained unchanged. The officers are now as follows: Admiral, 1; Vice-Admirals, 7; Rear-Admirals, 22, of whom 11 are yet junior; Captains, senior, 52; Captains, junior, and commanders, senior, 108; Commanders, junior, 150; Lieut.-Commanders and Lieutenants, 430; Sub-Lieutenants and Midshipmen, 270. Where officers of the same rank are distinguished as senior and junior, the juniors serve for a specified period before being promoted to senior. In the engineer branch of the Navy, 1 officer ranks as Vice-Admiral, 2 as Rear-Admiral; 6 as Captain. senior; 20 as Captain, junior, and Commander, senior; 48 as Commander, junior; 160 as Lieutenant-Commander and Lieutenant, and 100 as Sub-Lieutenants and Midshipmen.

The Navy Estimates for 1922–23 amounted to a total sum of 614,132,768 lire, being a reduction of 233,705,000 lire, as compared with the estimates of the previous year. The principal reduction is of 286,674,000 lire on the extraordinary votes, compensated by an increase of 52,969,000 lire. There are general economies, and the war charges are eliminated, but some increases are due to legislative action and the introduction of charges for the Eastern Adriatic, chiefly for the demands of the new base of Pola.

GERMANY.

An account was given in the "Annual" 1921–22 of the administrative organisation and material and personal situation of the German Navy upon its new footing. Being a small force, it has been arranged that it shall be brought under a Ministry of Defence. In these matters, of course, a good deal depends upon personality. Admiral Behncke, senior officer of the Navy, which he entered in 1883, is still "Chef der Marineleitung," to which position he was appointed December 20, 1920, with Frigate-Captain Wülfing as Chief of the Staff. Rear-Admiral Mommsen has succeeded Rear-Admiral Püllen at the Marine-Kommando-Amt and Rear-Admiral Hildebrand has replaced, at the Allgemeines Marineamt, Vice-Admiral Löhlein, who has retired from the service. The Naval Peace Commission is under the presidency of Rear-Admiral Reymann.

The forces are divided between the Baltic and the North Sea, and in each command, the officers and men are apportioned between the ships and the coast defences. The total strength is 15,000 men, but these could not all be employed in the ships, and complements would

be found, at the most, for 4 battleships, 6 cruisers, and all the torpedo craft and auxiliaries. The remainder are employed in the coast defences and in official duties, or are under training or engaged in it. The squadrons are not yet complete. In the Baltic, where Rear-Admiral Baron von Gagern is in command, the floating strength is under the orders of Commodore von Rosenberg, and consists of the battleship Hannover (broad pennant), the light cruisers Medusa, Thetis, and Berlin, a destroyer flotilla and a half flotilla, the surveying ship Panther, and certain tenders. The coast defence divisions are at Stralsund, Swinemünde, Kiel, and Pillau. There is a nucleus crew division at Kiel, and in the command are the establishments at Mürwik. At Kiel also is the Inspection of Torpedo and Mining, with boats attached for experiments and training. The schools at Mürwik and Kiel are directly under Vice-Admiral Dominik, Inspector of Training, who is senior to the Commander-in-Chief. In the North Sea, Vice-Admiral Zenker is in command, with his headquarters at Wilhelmshaven, while the ships are under Rear-Admiral Püllen, with his flag in the Braunschweig, and the cruisers Hamburg and Arcona attached, as well as a flotilla and a half flotilla. The coast defence divisions are at Wilhelmshaven, Cuxhaven, and Borkum, and the nucleus crew division is at Wilhelmshaven, where also the depôt inspection is located. The special section (Hafen-und Strombauressort) is maintained there which, before the war, constantly inspected the shifting sands of the Jahde, and directed the currents by submarine constructions, aided by a model of the whole region erected in the dockyard, with the sand, pebble, and other subaqueous formations of the Jahde laid out, and with inlets and outlets of water, representing currents, and gauges, frequently observed by means of a traversing electric bridge spanning the model.

Morale of the Personnel.

In the 1922 Navy List, the following are the numbers of officers: admiral, 1; vice-admirals, 2; rear-admirals, 7; captains, 32; frigate-captains, 18; corvette-captains, 75; captain-lieutenants, 153; senior lieutenants, 157; lieutenants, 120; midshipmen and Anwärter, 73; officers yet without commissions, promoted from the lower deck, 17; in the engineer branch, captains, 2; frigate-captains, 4; corvette-captains, 17; captain-lieutenants, 43; senior lieutenants, 39; lieutenants, 28; midshipmen and Anwärter, 40.

The men are of long service, but each year in April a certain number are discharged, and new entries come in their place. The young men are described as very good in discipline and behaviour, the last of the evil elements, such as played so disastrous a part in the old Navy, having been expelled, and the new men are reported to take pleasure in their duties. The relations between officers and men are good. Politics are discouraged, and the men are forbidden to belong to political societies or to take part in political meetings or assemblies. The officers are described as zealous and energetic, though the difficult conditions of life in Germany affect them severely. Yet, as they have adopted the Navy as a profession,

"they bear their hard conditions with patience." Their duties are largely in the work of training in the ships and coast defences. The two divisions of ships navigate at times independently, and there was an intention to unite them for combined exercises in the later summer. Ample opportunities are provided for promotion from the lower deck, through the rank of Anwärter, which may be equivalent to that of a mate in the British service. Young men may enter with the intention of becoming executive, engineer or accountant officers, but these must have been trained at a higher school or have a college certificate, and they qualify as cadets and midshipmen. They pass through the same training as the men, and any seaman or stoker, after two years in the Navy, may apply to pass an examination which will admit him as an Anwärter, according to the number of vacancies. In the 1922 Navy List were 51 Anwärter as midshipmen and cadets, working at the naval school at Flensburg-Mürwik, and 22 others, nearly all still in the ships, apparently to be promoted from the lower deck. In the engineer ranks the numbers in these categories were 33 and 7, all undergoing technical training.

Matériel.

The small cruiser which is to be built at Wilhelmshaven has only just been laid down, and is not expected to be completed before the end of 1924.

A serious disaster occurred on May 24 during night exercises in the Baltic, when the Hannover rammed the destroyer S18, entirely cutting off her bow. Ten men were lost. The remaining portion of the hull was towed into port.

OTHER FOREIGN NAVIES.

Denmark.

In February, 1919, a Commission was appointed to investigate and report on the future organisation of the defensive forces, and in May, 1922, it submitted its statement, on the basis of which the proposed Naval and Military Acts were to be prepared. As is the case in other States where defensive organisations are on a comparatively small scale, the Admiralty and War Office have a Minister of Defence in common, but each service has its own Director.

At the present time the Navy is directing attention chiefly to submarines and flying boats. The seaplane station is at Copenhagen.

The lower deck personnel are entered by both conscription and enlistment. A temporary class of petty officers is intended to be formed from the body of enlisted men, and under the new scheme a class of chief petty officers (Dœksofficerer) is to be formed from the existing lists of petty officers.

At present the coast defences are under the Army, but the new bill proposes to transfer such defences to the Navy so far as naval operations are concerned.

Netherlands.

The Netherlands Government was not a party to the Quadruple Treaty for the limitation of armaments, but became a signatory to some of the subsidiary Treaties. An identic Note was addressed to the Netherlands by the Powers (and also to Portugal) declaring that the rights of that Government, in relation to insular possessions in the Pacific, would be respected. The defence of those possessions has been the subject of anxious consideration by the Netherlands Government. One part of the Royal Dutch Navy is permanently at home, where the principal stations are the Helder and Christiansand, and is paid for by Holland. Not many vessels are kept in full commission. Another part is permanently in the East, and is supported by the colonies. A third part visits the colonies, for training and co-ordination purposes, and is paid for by the colonies when on the station. The People's Council of the East Indies advises on expenditure, but all the outlay must have the approval of the States General in Holland.

The considerable programme of naval expansion is still under consideration, and was to come up again when the new States General had been elected. The Fleet Committee, which was appointed to consider the defences, laid down a large twelve years' programme, but the Government Bill reduced its proportions, bringing it within a period of six years. It will be useful to give the features of the Bill, placing within brackets the proposals of the Fleet Committee.

Dutch Colonial Problem.

For the Home Forces:—Submarines 10 (18); submarine mine-layers, 2 (4); armoured gunboats, 4 (5); mine-layers, 13 (15); submarine depôt ships, 2 (none); mines 2,300 (3,500); some auxiliary vessels (as proposed); scouting seaplanes, 45, and small 'planes, 15 (as proposed). The Fleet Committee proposed also 4 mine sweepers, as nucleus for a war organisation, and a force for the defence of the Zuyder Zee, comprising one of the existing coast defence vessels and some small gunboats and auxiliaries. For the Dutch East Indies:—cruisers, 2, Java and Sumatra, both launched (4); destroyers, 12 (24); submarine mine-layers, 2 (4); gunboats, 4 (as proposed); mine-layers, 2 (9); submarine depôt ship Pelikaan (as proposed); mines, 4,500 (as proposed); 72 scouting 'planes, 18 small 'planes, and 18 bombers (all as proposed). The Fleet Committee recommended the development of Tandjong Priok as the principal naval base in the East Indies, and Sourabaia and Riouw as secondary bases, with a battery of medium guns in Macassar. This recommendation was embodied in the Bill, the work covering six years, subsequently extended to nine.

All these plans were to come before the new Government after the elections. The forces now in the East Indies are the coast defence ship De Zeven Provincien, 8 destroyers, 2 gunboats, 4 mine-layers, 4 torpedo boats, 5 K submarines, 6 surveying vessels, and 16 seaplanes. The depôt ship Pelikaan and 3 other K boats leave for the

East in the autumn. The coast defence ships are relieved, but all the other vessels are permanently in the colonies. There is an aerodrome at Tandjong Priok, and one is completing at Sourabaia. The European personnel go out for periods of two or four years. At present they are 50 per cent. of the whole. The technical ratings are European, except in the engine-rooms, but the native proportion is to be increased. Now they do not go beyond the rating of petty officer. There is a training establishment for natives in Macassar, and for engine-room artificers in Sourabaia.

Norway.

The Navy is administered, under the Minister of Defence, by the Commander-in-Chief, Rear-Admiral Berglund. The naval districts have their centres at Horten, Christiansand, Bergen, and Trondhjem. The Navy has its own air service, with stations at the two places first named, each with about 12 seaplanes, and at Horten a few flying boats. The Defence Committee, which is to advise on future policy, has not yet completed its work. There is some discussion on the question of bringing the coast defences under the Navy.

Sweden.

An energetic effort is being made to maintain the Swedish Navy in efficiency. A force of coast defence vessels, with destroyers and two flotillas of torpedo boats and submarines, is kept in full commission during the winter. The armoured cruiser Fylgia has been making a long instructional cruise. The other ships are stationed at Karlskrona and Stockholm, where are also the naval air stations.

Russia.

The Russian naval forces seem now to be making some material progress, and there is a certain advance in training, through a regular training service, located at Kronstadt, where are two cadet ships and gunnery, torpedo and mining schools, as well as a school ship for mechanics. There is also a rudimentary air station.

Trotsky is president of the Committee of Defence, and there is a naval commander-in-chief, usually resident at Moscow, whence apparently he directs whatever is done in the Arctic, Baltic, Black Sea, Caspian Sea, and on the Volga. He is a former captain. At some of the other stations the commanders are former naval officers. In the Baltic the chief of the naval forces was, and probably still is, a promoted naval lieutenant named Viktoroff, who flew his flag in the only battleship recently in commission, the former Petropavlovsk, now Marat. Ex-naval officers have been appointed to command the battle and cruiser squadrons, which until lately had not been organised, and the destroyer, submarine, mine-sweeping and mine-laying flotillas. German artificers and others have been able to make necessary repairs and to get the fleet into something like readiness for sea. Some material from former German naval establishments is said to have been bought, and the ships have cruised and manœuvred.

The port commander at Petrograd flew his flag in the Admiral Makharov. Like arrangements exist in the Black Sea. Few ships are kept in full commission, and these are reported to be in a poor state, lacking proper officers and specialists, getting little training, and being short of many essentials. The ruling policy seems to be to depend upon the flotillas. Some submarines have recently been sent overland from Kronstadt. Two of the Dreadnoughts, Poltava and Gangut, were recently out of commission, and reported in a bad state. Some older battleships will probably be sold for breaking up; none of them is fit for sea, and nothing is being done to make them effective. They have care and maintenance parties on board. The same applies to a large number of armoured cruisers, older destroyers, torpedo boats, submarines, gunboats, and other vessels. There is no intention of carrying forward the four battle-cruisers of the "Borodino" class—laid down before the opening of the Great War—though all have been launched. The ships and vessels which were with Wrangel and proceeded to Bizerta to be placed under French protection, may be sold to recover expenses.

Finland.

Six British destroyers have been acquired.

Esthonia.

The young Esthonian Navy is making steady progress. The direction is under the Minister of War, and there is an officer commanding the naval forces. The Naval School is well established. The floating strength consists of 3 ex-Russian torpedo boats and a submarine reported to be unfit for sea. Other ex-Russian vessels are 4 patrol boats, a gunboat and a transport. There are also 3 ex-British motor boats (C.M.B.), 6 ice-breakers, and about 18 mine-sweepers. There were no fewer than 6 hospital ships, but two, the Lakhta and Pallada, are to be returned to Russia under the Treaty of Dorpat.

Spain and Portugal.

The Spanish instructional squadron and division, including the recent battleships, with cruisers, destroyers, and motor launches, is in the Atlantic, and there are station vessels at Ferrol, Vigo, and Cadiz. The submarines are based on Barcelona, and there is a composite force at Cartagena. At these ports also are the naval air stations.

There is very little to say about the Portuguese Navy. The old battleship Vasco da Gama, is still in commission and flies the pennant of the officer in command. The ships have very little sea work. Three ex-Austrian torpedo boats have been added to the small flotilla, and a naval air service has been established.

Greece.

The British Mission advising the Hellenic Government, under Rear-Admiral Aubrey Smith, C.B., had a staff of 13, in addition to

the Admiral. A Greek squadron, comprising the armoured cruiser Giorgios Averoff, and the battleship Kilkis, with a torpedo flotilla and motor launches, was kept at Constantinople, and a smaller squadron, with the battleship Lemnos at Smyrna, but they were withdrawn. All the other vessels were at Salamis, the Piræus, and Poros. Some of the older vessels are to be sold.

Turkey.

The Treaty of Sèvres stipulated that all the warships interned under the terms of the Armistice were to be finally surrendered to the Allies. All of them are under allied supervision, most of them at the Golden Horn, but the ex-Goeben is at Touzla Bay in the Bay of Ismid. Two gunboats were released to the Turks for patrol duties in the Black Sea, two yachts are at the disposal of the Sultan, and a number of vessels are employed on various port and other services.

Brazil.

The Government has secured the services of a United States Mission to reorganise the Navy. The chief of the States Mission is Admiral Vogelsang. The battleship Minas Geraes was taken in hand during the Great War, when British and other yards were preoccupied with work for their own navies, for a complete overhaul and refit at the Brooklyn Navy Yard, U.S., where she remained sixteen months. Her boilers were adapted to burn oil, she received a new system of fire control, and had A.A. guns mounted. During the sojourn, her officers underwent courses of instruction and took part in naval manœuvres with the American Fleet. She returned to Rio in November, 1921. An agreement has since been reached under which the United States will supply most of Brazil's naval requirements, materials, and stores. The second Dreadnought São Paulo has since gone to Brooklyn for overhaul. A credit of about one million sterling has been opened. Additional work is to be carried out at the Ilha Grande, and the smaller bases at Para, Bahia, Santa Catharina, and Rio Grande do Sul.

Chile.

At the time when the war broke out, a British naval mission was at work in Chile, and in February, 1922, the Government secured the services of Captain G. N. Tomlin, C.M.G., R.N., as chief of the Naval War College at Valparaiso. Whatever is done in naval matters is likely to be done under British auspices. An account of the programme was given in the "Annual," 1921-22, page 67, but no progress has been made. It was intended to buy two battle-cruisers sold out of the British Navy, but owing to necessary economies in the naval expenditure the project has been abandoned. The armoured cruiser O'Higgins has been converted into a sea-plane carrier. The Navy disposes of four seaplanes and a flying

boat. The first-class torpedo boats are assigned to the defence of Talcahuano. The good understanding which has been established with Argentina appears to have abated naval agitation.

Argentina.

Eighteen auxiliaries of various types have been bought in Europe, employing 40 officers and 400 men on their passage.

China.

The Navy was broken up and divided on the political disruption of the country. The greater part of the Fleet adhered to the Canton Government, but many of the vessels are believed to be unserviceable.

John Leyland.

CHAPTER III.

Comparative Naval Strengths.

The Treaty for the limitation of naval armaments which was negotiated at Washington in the spring of 1922 has left the navies of the world unaffected, except in respect of capital ships. Certain stipulations are made as to the displacement and armament of light cruisers and aircraft carriers, and a tonnage ratio for each country for aircraft carriers has been laid down; but no action was taken in restraint of the building of light cruisers, destroyer leaders, destroyers, or submarines.*

Tabular statements which are appended reveal the present standing of the principal navies of the world in combatant ships of all types. A summary is shown on the opposite page.

The Washington Conference, while it will, on ratification by the several Powers,† lead to a limitation of the construction of capital ships, has not affected the present effective strength of the principal fleets of the world. The completed capital ships which it has been agreed shall be scrapped are or were all vessels which, in view of the progress of armament and armour and the development of air-power, had already lost their fighting value, and the capital ships in process of construction in Britain, the United States, and Japan have, with a few exceptions, been abandoned.

In capital ships, Britain and the United States are in future to be on an equality, though, on the one hand, Britain for the present has a tonnage advantage of 80,000 tons, and, on the other, the United States the benefit of three post-Jutland ships in contrast with one—the Hood—under the British ensign. This tonnage disparity will in a few years disappear. In 1925, when it is calculated—probably too optimistically—that the two new British capital ships to be laid down for the British Navy will be in commission, this country will possess the same number of post-Jutland ships as the United States, and not until 1935 will conditions of absolute numerical equality

* The Washington Naval Treaty is reproduced in full in the Appendix.

† It was unnecessary to obtain the approval of the British Parliament to the Treaty, which has gone automatically into operation. The United States and Japan have adopted it, the latter country with certain reservations, but no action has been taken yet by the other Powers—France and Italy. Early in October, the Secretary of the United States Navy announced that he did not intend to scrap United States battleships until France and Italy had ratified the Treaty. Our tables are based on the understanding that the Treaty will be effective as regards scrapping ships by all the signatory nations.

EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	British Empire.*				France.				Italy.				U.S.A.				Japan.			
	Built.	Building.	To be scrapped.	Total.	Built.	Building.	To be scrapped.	Total.	Built.	Building.	To be scrapped.	Total.	Built.	Building.	To be scrapped.	Total.	Built.	Building.	To be scrapped.	Total.
Battleships, 14-in. guns and upwards	10	—	—	10	—	—	—	—	—	—	—	—	12	9	7	14	6	2	2	6
Battle-cruisers, 14-in. guns and upwards	3	—	—	3	—	—	—	—	—	—	—	—	—	6	6	—	4	2	2	4
Battleships, smaller guns	12	—	4	8	10	—	—	10	9*	—	—	9*	19	—	15	4	5	—	5	—
Battle-cruisers, smaller guns	5	—	4	1	—	—	—	—	—	—	—	—	—	—	—	—	3	—	3	—
Light cruisers	53	8	—	61	5	3†	—	8	10	—	—	10	9	10	—	19	12	13	—	25
Flotilla Leaders and Destroyers	200	8	—	208	54	{1, 18†}	—	73	66	10	—	76	315	3	—	318	58	28	—	86
Submarines	93	8	—	101	50	12†	—	62	42	4	—	46	104	38	—	142	24	32	—	56

* At the Washington Conference, the Italian delegates expressed the desire that the Leonardo Da Vinci, which was sunk in August, 1916, and subsequently salved, should be regarded as a unit of the Italian Fleet, in view of the possibility that she might be reconditioned for service, but the effective list contains actually only nine units.

† Projected.

be attained; both countries at that date will have, according to the schedule, nine pre-Jutland vessels and seven of post-Jutland type.

According to the Treaty, France will retain, down to 1929, seven capital ships, all of pre-Jutland construction, and Italy will retain six, also of pre-Jutland design, until the following year. Both these countries have registered their desire to exercise freedom as to future construction of such vessels, "subject solely to the limitation that the displacement of individual ships should not surpass 35,000 tons, and that the total ship tonnage should keep within the limit imposed by the present Treaty."

The position of both navies in the Mediterranean has been affected by disasters at sea. In August, 1916, the Italian battleship Leonardo Da Vinci was sunk, but was salved in 1921. On the assembly of the Washington Conference, the Italian delegates requested that she should still be regarded as an effective unit of the fleet. The Italian point of view was accepted, the understanding being that this vessel might be reconditioned for service, but might not be replaced by a new ship.

This agreement acquires a new significance in view of the subsequent loss of the French battleship France, which occurred in September, 1922. This battleship is within a year of the same age as the Italian vessel. If the French Ministry of Marine decides not to attempt to salve the France, the French Government under the Treaty will have power to replace her by a new ship; but apparently the Italian Government, owing to the action of their delegates at Washington, after the salving of the Leonardo Da Vinci, have waived that right.

The Treaty specifies that "in case of loss or accidental destruction of capital ships or aircraft carriers, they may immediately be replaced by new construction subject to the tonnage limits prescribed in Articles IV. and VII. and in conformity with the other provisions of the present Treaty, the regular replacement programme being deemed to be advanced to that extent." The *Times* reported on October 10 last that the Supreme Naval Council, meeting in Paris, had concluded that the France could not be refloated and that one of the units of the Normandie class, of France's pre-war programme, should be proceeded with. According to the ordinary interpretation of the Treaty, France, since her battleship is not to be salved, will have the right to replace her at once, whereas Italy has relinquished such right. This anomalous position illustrates the difficulty inherent in an international agreement for the limitation of naval armaments, even when, as in the case of the Washington Treaty, its scope is strictly limited.

So far as Japan is concerned, her position under the Treaty is at present an exceptional one in view of the agreement which was reached that the Japanese Navy should retain the battleship Mutsu. This vessel was approaching completion when the Conference met at Washington, and the Japanese representation that she should not be scrapped was successful. The result of this agreement is that Japan retains eight pre-Jutland and two post-Jutland ships, and this will

be her strength until 1934, when a new vessel will be completed to take the place of the Kongo.

Under the Washington Naval Treaty, the numerical strength of the signatory Powers in light cruisers, flotilla leaders, destroyers, and submarines is unaffected: each country retains its liberty to build as many of these types as it cares to provide for. As is indicated in the chapter dealing with foreign navies, advantage of this freedom of action is being taken by several countries.

The usual tables of battleships, battle-cruisers, and light cruisers, of the five great Naval Powers are appended.

THE EDITORS.

TABLE I.—BATTLESHIPS WITH 14-IN. GUNS AND UPWARDS.

BRITISH EMPIRE.

Launched.	Name.	Displacement.
		tons.
1915	Malaya	
1914	Valiant	
1914	Barham	27,500
1913	Queen Elizabeth	
1913	Warspite	
1915	Royal Sovereign	
1914	Royal Oak	
1915	Revenge	25,750
1915	Resolution	
1916	Ramillies	
	10 ships.	265,350

FRANCE.

Launched.	Name.	Displacement.

ITALY.

Launched.	Name.	Displacement.

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
	South Dakota *	
	Indiana *	
	Montana *	43,200
	North Carolina *	
	Iowa *	
	Massachusetts * ...	
1921	*Washington* * ...	
1921	*Colorado*	
1922	*West Virginia* ...	32,600
1920	Maryland	
1919	Tennessee	32,300
1919	California	
1917	Idaho	
1917	New Mexico ...	32,000
1917	Mississippi ...	
1915	Arizona	31,400
1915	Pennsylvania ...	
1914	Oklahama	27,500
1912	Texas	
1914	Nevada	27,000
1912	New York	
	14 ships.	429,700

JAPAN.

Launched.	Name.	Displacement.
		tons.
1921	*Tosa* *	40,100
1921	*Kaga* *	
1920	Mutsu	33,800
1919	Nagato	
1917	Hyuga	31,260
1916	Ise	
1915	Yamashiro	30,600
1914	Fuso	
	6 ships.	191,320

TABLE II.—BATTLE-CRUISERS WITH 14-IN. GUNS AND UPWARDS.

BRITISH EMPIRE.

Launched.	Name.	Displacement.
		tons.
1918	Hood	41,200
1916	Renown	26,500
1916	Repulse	
	3 ships.	94,200

FRANCE.

Launched.	Name.	Displacement.

ITALY.

Launched.	Name.	Displacement.

UNITED STATES.

Launched.	Name.	Displacement.
	Lexington *‡ ...	
	Constellation *‡	
	Saratoga *‡ ...	43,500
	Ranger *	
	Constitution * ...	
	United States * ...	

JAPAN.

Launched.	Name.	Displacement.
		tons.
	Akagi *†	42,000
	Amaki *†	
1913	Kirishima	
1913	Haruna	27,500
1912	Hiyei	
1912	Kongo	
	4 ships.	110,000

NOTE.—Vessels of which the names are printed in italics are under construction.
† May be converted into aircraft carriers.

* To be scrapped under the Washington Treaty; not included in totals.
‡ Two of these three vessels will be converted into aircraft carriers.

TABLE III.—BATTLESHIPS WITH SMALLER GUNS.

BRITISH EMPIRE.			FRANCE.			ITALY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.
1913	Benbow		1913	Bretagne		1913	Andrea Doria ...	22,562	1911	Arkansas	26,000	1911	Settsu *	20,800
1913	Emperor of India	25,000	1913	Lorraine	23,177	1913	Caio Duilio		1911	Wyoming		1907	Aki *	19,800
1912	Marlborough ...		1913	Provence		1911	Conte di Cavour ...	22,023	1910	Florida	21,825	1906	Satsuma *	19,350
1912	Iron Duke		1911	Courbet		1911	Giulio Cesare ..		1909	Utah		1905	Kashima *	16,400
1912	Ajax		1912	France **	23,095	1910	Dante Alighieri ...	19,190	1909	Delaware ‡	20,000	1905	Katori... *	15,975
1911	Centurion		1911	Jean Bart		1907	Roma †		1908	North Dakota ‡ ...				
1911	King George V....	23,000	1912	Paris			Napoli		1908	Michigan *§ ...				
1913	Erin * (late Reshadieh)		1906	Diderot	18,561	1904	Vittorio Emanuele †	12,655	1908	South Carolina *§				
1911	Thunderer		1909	Condorcet	18,487	1904	Regina Elena † ...		1906	New Hampshire *				
1911	Conqueror *... ...	22,510	1909	Voltaire	18,457				1905	Vermont *	16,000			
1911	Monarch *								1905	Kansas *				
1911	Orion *...								1905	Minnesota * ..				
									1904	Louisiana *				
									1904	Connecticut * .				
									1904	Nebraska *				
									1904	Rhode Island * ...				
									1904	Georgia *	14,948			
									1904	New Jersey * ...				
									1904	Virginia *				
	8 ships.	191,500		10 ships.	217,416		9 ships.	158,980		4 ships.	95,650			

TABLE IV.—BATTLE-CRUISERS WITH SMALLER GUNS.

BRITISH EMPIRE.			FRANCE.			ITALY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displacement	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.												tons.
1913	Tiger	28,500										1907	Ibuki *	14,600
1911	Princess Royal *	26,350										1907	Kurama *	
1910	Lion *											1906	Ikoma *	13,750
1911	New Zealand * ...	18,800												
1911	Australia * (A) ...													
	1 ship.	28,500												

* To be scrapped under the Washington Treaty; not included in totals.
† The Minister of Marine has power to remove these vessels from the list or to dispose of them.
§ One of these two vessels may be retained as a target ship.
** Foundered, August 25, 1922.
‡ To be scrapped when replaced by West Virginia and Colorado.
(A) Australian Navy.

Table V.—Light Cruisers.

BRITISH EMPIRE.

Speed.	Name.	Displacement.
kts.		tons.
32	Courageous* ...	18,600
32	Glorious*	
33	*Emerald*	7,550
33	*Enterprise*	
30	*Effingham*	
30	*Frobisher*	9,750
30	Hawkins	
29	*Despatch*	4,765
29	*Diomede*	
29	Durban	
29	Delhi	
29	Dunedin	4,650
29	Danae	
29	Dauntless	
29	Dragon	
29	*Capetown*	
29	Cairo	
29	Calcutta	
29	Carlisle	
29	Colombo	4,190
29	Cardiff	
29	Coventry	
29	Curlew	
29	Ceres	
29	Curacoa	
29	Caledon	
29	Calypso	4,120
29	Caradoc	
29	Concord	
29	Centaur	
29	Cambrian	3,750
29	Canterbury	
29	Constance	
29	Castor	

FRANCE.

Speed.	Name	Displacement.
kts.		tons.
28½	Metz ... ... (*ex* Konigsberg)	4,200
28¼	Mulhouse ... ... (*ex* Stralsund)	4,480
27½	Strasbourg ... ... (*ex* Regensburg)	4,842
27	Thionville ... ... (*ex* Novara)	3,444
26¼	Colmar ... ... (*ex* Kolberg)	4,280
	Three vessels projected	8,000

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
28¼	Taranto ... ... (*ex* Strassburg)	4,480
28	Marsala	3,518
28	Nino Bixio	
28	Quarto	3,218
27½	Ancona ... .. (*ex* Graudenz)	4,842
27½	Bari ... ... (*ex* Pillau)	4,320
27	Brindisi ... ... (*ex* Helgoland)	3,444
27	Venezia ... ... (*ex* Sadia)	
22	Libia	3,830
16½	Campania	2,444

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
35	*Omaha*	
35	*Milwaukee*	
35	*Cincinnati*	
35	*Raleigh*	
35	*Detroit*	
35	*Richmond*	7,500
35	*Concord*	
35	*Trenton*	
35	*Marblehead*	
35	*Memphis*	
24	Chester...	
24	Birmingham ...	3,750
24	Salem	
16½	Galveston	
16½	Chattanooga ...	
16½	Tacoma	3,200
16½	Denver...	
16½	Des Moines	
16½	Cleveland	

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
36	*Natori*	
36	*Isudzu*	5,570
36	*Yura*	
36	Kuma	
36	Tama	
36	Kitakami	5,500
36	Kiso	
36	Oh-I	
36	Nagara	
	Kinu	
	Ayase	
	Otonase	5,570
	Minase	
	Abukuma	
	Kako	
	Naka	
	Lendai	
	Jindzu	
	Yubari	
31	Tenryu	3,500
31	Tatsuta	
26	Yahagi	
26	Hirado	4,950
26	Chikuma	
23	Tone	4,100

* These vessels, as their displacement reveals, are of a special class, but they are only lightly protected.

TABLE V.—LIGHT CRUISERS (*continued*).

BRITISH EMPIRE.			FRANCE.			ITALY.			UNITED STATES.			JAPAN.		
Speed.	Name.	Displace-ment.	Speed.	Name.	Displace-ment.	Speed.	Name.	Displace-ment.	Speed.	Name.	Displace-ment.	Speed.	Name.	Displace-ment.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
29	Champion													
29	Calliope													
29	Comus													
29	Conquest	3,750												
29	Carysfort													
29	Cordelia													
29	Caroline													
29	Cleopatra													
29	Royalist													
29	Inconstant													
29	Phæton...	3,500												
29	Undaunted													
29	Aurora (c)													
28¾	Vindictive	9,750												
26	Birmingham ...	5,440												
26	Lowestoft													
25½	Southampton ...	5,400												
25½	Dublin													
25½	*Adelaide* (A) ...	5,560												
25½	Yarmouth													
25½	Dartmouth	5,250												
25½	Weymouth													
25½	Brisbane (A) ...													
25½	Sydney (A)	5,400												
25½	Melbourne (A) ...													
25½	Chatham (N.Z.) ...													
	60 ships.	317,980		8 ships.	45,246		10 ships.	37,058		19 ships.	105,450		25 ships.	103,510¶

(A) Australian Navy. (C) Canadian Navy. (N.Z.) New Zealand Government. ¶ Tonnage of 5 new ships to be added.

NOTE.—Vessels of which the names are printed in italics are under construction.

CHAPTER IV.

Naval Aspects of the Washington Conference.

The Washington Conference marks an important advance in the cause of peace. In order to obtain a true appreciation of the value of the meeting of the representatives of the principal maritime Powers, it appears to be necessary to compare the situation of 1921 and at the present time.

Before the Conference, the two principal maritime Powers in the Pacific, the United States and Japan, were engaged in extensive rival building programmes and viewed each other with a certain amount of distrust.

The consequent very remarkable increase in naval strength of these two nations could not have remained a matter of unconcern to Great Britain with its scattered Dominions, two of which are situated in the Pacific, whilst the western shores of Canada are also washed by that ocean; and if Great Britain had not taken steps to commence a building programme, it would have found itself with a dis-classed fleet to face their powerful modern ships. This might have jeopardised the safety of the Empire. Thus history was repeating itself notwithstanding all the terrible experiences of the late war, the main cause of which was rivalry in armaments.

The Anglo-Japanese alliance was a further source of suspicion and distrust on the part of a large section of American opinion, although repeated assurances had been given by Great Britain that it would never be used against the United States.

This has now all been changed. It has been found that by calling a meeting of the leading men of the different nations, a basis could be agreed upon for the relative strength of the several maritime Powers in capital ships as well as in aircraft-carriers; in place of the Anglo-Japanese alliance a pact could be made governing the future of the Pacific, which should remove all apprehension between the Powers whose shores are washed by that ocean.

This Four-Power Pact only awaits final confirmation by the Governments of these countries, which is not in doubt. A further and most necessary precaution has been agreed upon to remove the temptation for engaging in an aggressive war and reducing the possibility of attack, viz. the non-fortification or establishment of new protected bases.

The situation has been eased so much that instead of apprehension of aggression, the friendly and peaceful relations between the Pacific Powers are on an even sounder and more permanent basis than when they were acting together against an open enemy. Having

briefly summarised the progress that has been made for preserving the peace in the Pacific, some remarks may be apposite on the need of a strong navy for the British Empire and the steps that have been taken in the past to keep it within reasonable dimensions.

British Naval Position.

For over a hundred years it has been the policy of the British Government to maintain a predominance in naval power. This predominance has at times been seriously threatened, but public opinion has always been ready to support the efforts of the Government of the day. It was generally recognised that a strong and efficient Navy was essential for the safety of the Empire, due to its far-flung Dominions "on which the sun never sets"; this conclusion was strengthened by the realisation that the home-country now depends on the import of four-sixths of the necessities of life.

It is to the credit of the British Navy that although it has possessed this superiority over such a long period, it has never abused its strength. Sir Cyprian Bridge, in an article in the *Edinburgh Review* for April, 1921, clearly shows "how the long maintained primacy of the British Navy was never opposed to legitimate expansion of either trade or territory by any nation, great or small." During this period, the Navy has been a great asset for the preservation of the peace of the world. On several occasions its known strength has caused nations to hesitate before challenging it.

It is quite possible that if it had been definitely made known to Germany that Great Britain would intervene in the event of an unprovoked attack on Russia or France, the world might have been spared the late appalling war, the effect of which has had a staggering effect on most of the nations of the world. M. Poincaré, in his recent work on the "Origin of the War," states that on July 31, 1914, the following despatch was received from the French Ambassador at Berlin dated July 31, 1914:—

> The hesitating attitude of the British Government is of a nature that may lead to the most terrible consequences, for here in Berlin they have the greatest hopes of success in a struggle against France and Russia alone. The possibility of the intervention of Britain is the only eventuality that has any effect on the Emperor, his Government, and every interest.

If the French Ambassador's surmise was correct, it was the dread of the threat of the sea-power of Great Britain and the potential strength of the Empire, more than the intervention of our small but most efficient Army, that might have caused Germany to hesitate before throwing down the gauntlet.

By the terms of the Armistice, the navies of Germany, Austria, and Turkey have practically ceased to exist, only a comparatively few ships being allowed to Germany. All submarines have been surrendered. Thus the German naval menace has become a threat of the past.

The British Navy, having reached a level of power never before attained by this country, was for the moment left without a rival.

On the conclusion of war, the Admiralty at once began to

demobilise officers and men, and to reduce the active fleet. All new construction was stopped, except the completion of the Hood (a pre-Jutland design), which was then nearing completion. It must be remembered that during the demobilisation, the services of the Navy were required in the Baltic and White Sea, and in the Near East, so demobilisation was necessarily slower than it would have been in other circumstances.

For the Navy Estimates for 1919–20 and again for 1920–21, no new construction of capital ships was included. While Great Britain had suspended all new construction, and condemned and scrapped many of the older ships as fast as the ship-breaking firms could deal with them, the United States and Japan had continued their building programmes, so that in about 1924 they would have had in commission a considerable number of post-Jutland capital ships of great power and embodying all the improvements suggested by the experiences of the war.

The Admiralty were faced with a serious situation, as any further delay in commencing the replacement of old battleships would have left the country in a critical position. After most careful consideration, they recommended in the Estimates of 1921–22 the commencement of 4 battle-cruisers to replace 8 older battleships. This was approved by the Cabinet, and passed by Parliament after discussion and some dissent.

The One-Power Standard.

In the same Estimates, the First Lord laid down the Government's new standard of battleship strength for the Navy: it was "To be equal to the strength of any one other naval Power," *i.e.* a "One-Power Standard." As mentioned before, we had for a century aimed at superiority, and it is believed that the world as a whole benefited by this strength. To voluntarily abdicate this position of advantage and to recognise equality was a great concession, besides being a proof to the world that Great Britain had no ambitious designs. Such a standard is not even sufficient to defend the world-wide communications of the Empire, far less to be used offensively, as evidenced by the enormous fleet the Allies found it necessary to employ in order to defend their communications during the late war.

We need not recall the many occasions on which our statesmen have stated that our standards of naval strength have never been made against any standard that the United States might determine. The time seemed opportune for some leading statesman or nation to take the lead in trying to prevent a renewal of rivalry in shipbuilding programmes, with all its disastrous consequences. Great Britain in order to maintain a One-Power Standard had been forced unwillingly to commence a programme gradually to replace pre-Jutland battleships. Thus, unless the other two leading naval Powers reduced or limited their naval programmes, all the elements for naval rivalry were in operation.

Fortunately for the future of the world, in March, 1921, President Harding, on being sworn in as President of the United States, said that "America would not be entangled. She would promote peace

and participate in any seemly programme to lessen the possibility of war and reduce the burden of armaments, but if war was again pressed on her, he hoped all America, body and soul, would be concentrated on national defence."

In June, 1921, the President obtained from Congress, in broad and general terms, an opinion favourable to world disarmament, and the amendment proposed by Senator Borah which authorised the President to enter into disarmament negotiations with Great Britain and Japan was almost unanimously adopted.

The American President's Action.

The President of the United States, having been thus authorised by Congress to enter into negotiations for a reduction of armaments, issued invitations to the Governments of Great Britain, Japan, France, and Italy, suggesting a conference at Washington, and requesting these countries to send representatives. It was felt that as any question of naval disarmament was so closely allied to the future of the Pacific, other nations with interests or possessions bordering on that ocean, viz. China, Holland, Portugal, and Belgium, should be included. Acceptance having been received from each of the Governments, Armistice Day, November 11, 1921, was named for the date of assemblage.

The selection of Washington was a happy choice for the meeting. It was removed from the centre of the recent conflict. No European capital would have appealed to the public opinion of the United States, where some distrust was felt for European politics. It further offered the great Republic an opportunity of taking a close interest in some of the many difficult and conflicting problems left as the aftermath of the war.

After the several previous disappointments, there was some apprehension that the Conference might fail to secure any tangible result, in which case the set-back would have had disastrous results. Most happily the premonitions of failure did not materialise, and, subject to ratification by the several Governments of the treaties signed by their representatives, a good commencement was made, on which further advances in the great cause of future peace and reduction of armaments can be based.

Great care was taken by each nation to select the most eminent representatives, accompanied by a suitable staff of assistants and experts. The Prime Minister, M. Briand, represented France. Mr. Arthur Balfour, now Earl Balfour, was the principal British representative, and America appreciated the compliment, and from his first arrival until he left he was treated as an honoured guest. He was supported by Lord Lee, First Lord of the Admiralty, and Lord Beatty for the first part of the Conference, and the following Dominion representatives: the ex-Prime Minister of Canada, Sir Robert Borden; Senator Pearce for Australia; Sir John Salmond for New Zealand; and Mr. Srinivesa Sasti for India. Japan was represented by Baron Kato, Minister for the Navy; Italy by Senator Carlo Schanzer.

With so many distinguished foreign representatives present it was a happy idea that Armistice Day should have been selected for the impressive ceremony of the interment of America's "Unknown Warrior" in the presence of the President, and a large concourse of people, including all the foreign representatives, who thus had the opportunity of doing honour to the "Unknown Warrior." The opening of the Conference was accordingly postponed to the following day, November 12.

The Inaugural Address.

The President, Mr. Harding, opened it in person, and in his address used the following words:—

"It is an earnest of the awakened conscience of the twentieth-century civilisation.

"It is not a convention of remorse, nor a session of sorrow. It is not a conference of victors to define terms of settlement; nor is it a Council of Nations to remake humankind.

"Rather it is a coming together from all parts of the world to apply the better attributes of mankind to minimise the faults of our international relationship.

"The call is not to the United States alone, but rather the spoken word of a war-wearied world struggling for restoration, hungering and thirsting for better relationship; of humanity crying for relief and craving for assurance of lasting peace.

"Speaking officially for the United States I can say 'A hundred millions of our people frankly want less armament and none want war.'"

The American Declaration.

Mr. Hughes, the Secretary of State, presided at the next and the further plenary meetings of the Conference. No one knew in advance in what order the several subjects would be introduced, or whether formal proposal would even be made.

Mr. Hughes' opening speech was sensational. He commenced with the subject of limitation of armaments, and, in reviewing the attempts that had been made in the last twenty years to limit armaments by international agreements, recalled that when Mr. Root, sixteen years ago, proposed a discussion for a reduction or limitation of armaments, "it is significant that the Imperial German Government expressed itself as absolutely opposed to the question of disarmament, and the German Emperor threatened to decline to send delegates if the subject of disarmament was discussed. But what once had been convenient or desirable is now a matter of vital necessity. The time has come, and this Conference has been called not for general resolutions or mutual advice, but for action."

"We must get rid of naval programmes, as one programme inevitably begets another. There is only one adequate way out: that is to end competition."

He then spoke of the serious sacrifices involved. Mr. Hughes recognised the vast sums that had been expended on ships under

construction, and that to abandon these programmes would involve heavy loss; yet, if the present construction of capital ships went forward, other ships would inevitably be built to rival them, and this would lead to others. Thus the race would continue as long as the ability to continue lasted; the effort to escape sacrifice would be futile. Mr. Hughes then declared, "It is clear that no one of the Naval Powers should be expected to make these sacrifices alone." The only hope of any limitation of armaments was an agreement between the nations concerned. This agreement should be entirely fair and reasonable in the extent of the sacrifice required of each Power.

The Scrapping Policy.

On behalf of the American Delegation acting under instructions of the President of the United States, he submitted a concrete proposition for an agreement on the limitation of naval armaments which was broadly :—

(*a*) The elimination of all capital ship programmes, either actual or projective.
(*b*) A further reduction through the scrapping of certain of the older ships.
(*c*) Regard to be had to the existing strength of the conferring Powers.
(*d*) The United States capital ship tonnage to be taken as the measurement strength for navies and proportional allowance for auxiliary combatant craft to be prescribed.

The basis of the proposed scheme was as follows :—

To Retain.	Tonnage.	To Scrap.	Tonnage.
United States, 18 capital ships .	500,000	30 ships	845,740
Great Britain, 22 ,, ,, .	604,450	19 ships . . . . And stop continuation on 4 new Hoods.	583,375
Japan, 10 ,, ,, .	299,700	To abandon programme on ships not laid down and 10 ships building, total tonnage	448,928

The tonnage allowance for France and Italy was to be reserved for later consideration of the Conference.

The tonnage basis for capital ship replacement, it was proposed, should be as follows :—

> United States, 500,000 tons; Great Britain, 500,000 tons; Japan, 300,000 tons—styled subsequently the 5.5.3 standard.

A ten years' naval holiday.

Capital ships to be scrapped and to be disposed of in accordance with a method to be agreed upon.

Proposals were made about replacements, and life of capital ships which were to be considered by the expert Committees and embodied in the Treaty.

It was urged that no capital ship should be laid down during the term of the agreement whose tonnage displacement would exceed 35,000 tons.

Auxiliary combatant craft were divided into three classes:

(*a*) Auxiliary surface combatant craft; (*b*) Submarines; (*c*) Airplane-carriers; and the tonnage ratios put forward were:—

(*a*) *Auxiliary combatant craft:*	United States . .	450,000 tons.
	Great Britain . .	450,000 ,,
	Japan	270,000 ,,
(*b*) *Submarines:*	United States . .	90,000 ,,
	Great Britain . .	90,000 ,,
	Japan	54,000 ,,
(*c*) *Airplane-carriers:*	United States . .	80,000 ,,
	Great Britain . .	80,000 ,,
	Japan	48,000 ,,

Detailed instructions were proposed to govern each class. It was further declared that regulations should be provided to govern the conversion of ships of the Mercantile Marine for war purposes.

These very definite and decided limitations were at once accepted in principle by Lord Balfour in one of his most eloquent and statesmanlike speeches. He stated how much Great Britain was in the fullest sympathy with the ideal of a reduction in armaments, and suggested that the proposals should be referred to the naval experts to be examined in greater detail. Baron Kato, for Japan, generally accepted the proposals, subject to expert examination. Surprise and general satisfaction was expressed at receiving such clear and concrete proposals as a basis for investigation.

Capital Ships.

The Japanese Government found special difficulty in agreeing to the scrapping of their latest battleship, Mutsu, which had been built and engined in Japan, and much pressed that in place of the Mutsu the Setsu might be scrapped.

This variation would raise the tonnage allowed to Japan by 13,000 tons; while the difference in tonnage was small, there would be a considerable difference in efficiency, as the retention of the Mutsu would give Japan two post-Jutland ships of the latest design.

In order to meet this, the United States suggested that she should be allowed to complete and retain two ships of the "West Virginia" class then under construction, on the understanding that on completion of these two ships, the North Dakota and Delaware would be disposed of. In accordance with this arrangement it was decided that Great Britain might construct two new capital ships not exceeding 35,000 tons, and on their completion the Thunderer, King George V., Ajax, and Centurion should be disposed of.*

These adjustments, which have been embodied in the Treaty, fix the maximum tonnage to be retained:—

United States	525,850 tons
Great Britain	558,950 ,,
Japan	301,320 ,,

* The four improved Hoods then under construction were, of course, abandoned.

After consultation, France and Italy agreed to a relative standard for capital ships:—

France . . .	221,170 tons
Italy	182,800 „

Both nations can lay down new tonnage in 1927, 1929, and 1930. A detailed table of replacements has been laid down for all five nations until 1942.*

No capital ship is to exceed 35,000 tons standard displacement, or to carry guns of a larger calibre than 16 in.

Auxiliary Surface Combatant Craft.

The proposal was to adopt the same relative standard for auxiliary surface combatant craft as had been accepted for capital ships.

This did not make any allowance for the situation, circumstances, and environment of the five nations, neither of them being similarly placed.

As an illustration we may take the British Empire. A glance at the map of the world will show how the Dominions are in the four quarters of the globe. The British Empire's internal communications are across the sea, and form a network of routes in all oceans. The routes pass in front of the seaboards of different countries, and are very vulnerable from surface and submerged attack.

The internal communications of a self-contained Continental Power are the railroads of that country; these are automatically defended by the armed forces of the nation, possibly without the necessity of a sea force. Further, any nation that is contiguous to another nation possessing torpedo-carrying vessels, surface or submerged, must have special vessels to meet this menace. Danger from the air has also to be kept in view.

Probably for these and other reasons, no agreement was reached at the Conference. A true appreciation of the great need that Great Britain has for cruisers in the event of hostilities can be obtained from our experience in the war with the United States in 1812, and the recent war a century afterwards, in 1914.

British Experience in the American War.

In 1812, the United States Navy consisted of only 4 special frigates, 2 ordinary frigates, 8 brigs or small vessels—14 in all. At the outbreak of the war, we had a 64-gun ship, 7 frigates, and some corvettes and sloops off the American coast.

To deal with these fourteen vessels and the privateers, our force on that station had to be increased to 11 ships of the line, 34 frigates, and 38 sloops—some 83 vessels to control and defeat the 14 vessels and the privateers. At the same time, our Navy, being on a war footing against Napoleon, the remaining oceans and seas were guarded by hundreds of ships of war.

In the recent war, on the outbreak in August, 1914, the Grand

* Cf. Appendix.

Fleet effectively contained the German High Sea Fleet in the North Sea. Outside the North Sea and the Mediterranean, the Germans had 2 heavily armed modern armoured cruisers, and 6 fast modern cruisers—8 ships in all.

Great Britain had on the several foreign stations: 1 pre-Dreadnought battleship, 2 modern armoured cruisers, 5 other armoured cruisers, 4 modern fast light cruisers (the fifth was in dock at that time and not available for four days)—12 ships in all. Both nations had other vessels of little fighting value, due either to their age or size.

Cruisers in the Great War.

The first British move in 1914, as in 1812, was to reinforce the cruisers to meet the German cruiser menace. There were in reserve in Home waters, 5 squadrons, mostly consisting of semi-obsolete vessels. These had been mobilised for the summer exercises, and as soon as possible they were despatched to their several war stations.

At this time there was only one modern light cruiser to protect our food supply and watch national interests on both sides of the Continent of South America. Incidentally, for reasons of national economy, we had no vessel permanently cruising on that station at the time. Our reserves of mercantile ships suitable for carrying armament were at once requisitioned. They took some time to fit out and get on their stations.

On the declaration of war, the German Government at once ordered all their mercantile ships to proceed to the nearest neutral ports for safety. One of the first calls for our cruisers was to watch off certain neutral ports, where it was known that enemy ships suitable for arming had taken safety. This was necessary to prevent them escaping and preying on our trade. The next call was for cruisers to convoy transports bringing troops from the Dominions and India to the main seat of war.

For a time, owing to the paucity of cruisers, our great oversea ocean trade was insufficiently protected. The demand for cruisers was received from every quarter. The Grand Fleet demanded more, and many more were required for the much threatened ocean routes. The reinforcements took some time to reach the more distant destinations, as they all had to come from England. The surplus pre-Dreadnought battleships were utilised as cruisers, and the cruisers of our Allies filled up some of the gaps.

In four months the German cruisers were accounted for, and, owing to the commanding position of the Grand Fleet, other enemy cruisers were not sent out to replace them.

Fortunately, during this time, only 2 of the 8 German cruisers acted energetically against our trade, otherwise the insufficiency of the number of modern cruisers on the outbreak of war would have had most serious consequences on the convoying of transports and the supply of food and raw materials to the Home country.

Similar conditions will occur in the unfortunate event of

any break of the peace with a maritime Power in future. The nation must ensure that our trade is sufficiently guarded against eventualities.

The Submarine Problem.

Most important proposals were made and considered at the Washington Conference as regards submarines. Lord Lee pointed out that the tonnage suggested by the United States was really in excess of the tonnage possessed by America or Great Britain. It seemed strange to put before a conference for the limitation of armaments proposals designed to foster and increase a type of war vessel, which, according to the British view, was open to more objection than surface capital ships. He proposed, in the name of the British Government, "the total and final abolition of submarines." This proposal was further emphasised by Lord Balfour on the following day, when he declared that "the British Empire has no hope of getting any important support for this course at this Conference, but I earnestly trust that our debates may go beyond the limits of this room, and even beyond those of the public sessions."

Considerable discussion ensued. M. Sarrant for France said that France desired submarines not for offensive purposes, but to defend her coast-lines and colonial possessions.

Signor Schanzer, speaking on behalf of the Italian Delegation, said that Italian naval experts did not share Lord Lee's opinion that the submarine was not an efficient means of defence. They believed the submarine to be an admirable weapon for the defence of the Italian coasts and for the protection of lines of communication.

Mr. Hanihara, for Japan, said that he was unconditionally opposed to all abusive uses of submarines, such as were recently practised by a certain nation, but he felt that the legitimate use of submarines was justifiable and necessary for defence purposes.

Mr. Hughes declared himself deeply impressed by Lord Lee's statement, adding that he understood the "crux" of the controversy to be the question as to the use of the submarine as a weapon of defence. The American Advisory Committee were of opinion that the retention of a large submarine force might at some future time result in the United States holding its outlying possessions.

Mr. Balfour then submitted the formal expression of the British Delegation's attitude on the question as follows:—

> The British Empire Delegation desires formally to place on record its opinion that the use of submarines, whilst of small value for defence purposes, leads inevitably to acts which are inconsistent with the laws of war and the dictates of humanity, and the Delegation desires that united action should be taken by all nations to forbid their maintenance, construction, or employment.

Strong detestation was expressed by all the representatives of the inhuman conduct of the U-boats.

The subsequent discussion, although it did not lead to the adoption of the British proposal, made a profound impression and no doubt the matter will be further considered at some future conference. It is to the credit of the representatives of Great Britain to have advanced such a bold and humane suggestion.

A reduction of the total submarine tonnage for each country was afterwards proposed by Mr. Hughes, but it was finally decided, in view of the attitude of some of the delegates, that no restriction should be placed on the total submarine tonnage allowed, or on the size and armament of units. A sub-committee was appointed, under the presidency of Mr. Root, to draft regulations for the more humane use of submarines and the protection of the lives of neutrals and non-combatants, and these regulations were incorporated in a separate Treaty.*

Light Cruisers and Airplane-Carriers.

The proposed limits for auxiliary surface combatant craft not having been accepted, the proposal dropped, except that a limitation of size was accepted. It was agreed that :—

1. All combatant surface craft, except airplane-carriers, are limited to a unit displacement of 10,000 tons, and are not to carry a gun with a calibre in excess of 8 in.

2. No restriction is placed on the total tonnage allowed.

There was some discussion on the size and total tonnage for airplane-carriers. Both America and Japan requested freedom to convert some of their partly completed capital ships into carriers. The result was that :—

(*a*) The total tonnage in this class should not exceed—

Great Britain and the United States	135,000 tons
Japan	81,000 „
France and Italy	60,000 „

(*b*) Replacement can take place after twenty years, but vessels of this class already built or building on November 12, 1921, may be considered as experimental and may be replaced without regard to age.

(*c*) The limit in tonnage for each unit is 27,000 tons, and the size of gunnery armament shall not exceed 8 in.

In order to allow for the conversion of certain battle-cruisers, now building, into carriers, each Power can convert any two of their ships, displacement not to exceed 30,000 tons each, provided the total displacement allowed is not exceeded.

(*d*) In reference to the arming of merchant vessels, it was agreed that, no preparations are to be made in merchant ships in time of peace for the installation of armament, other than the necessary stiffening of decks for the mounting of guns, which are not to exceed 6 in. in calibre.

The Four-Power Pact.

Besides the limitation of naval armaments, there remained the future of the Pacific to be settled. Schemes were in preparation to

* Cf. Appendix.

establish new potential bases, and the Anglo-Japanese Alliance occasioned considerable apprehension with American public opinion.

For the better relations between the United States and Great Britain, it was desirable that some other Treaty should be made to include all three Powers, and it was recalled that France also had possessions in the Pacific.

With the representatives of all the Powers present, the occasion seemed suitable to effect a treaty to embrace the four nations. The Four-Power Pact has been the result.

Article XIX. of the Naval Treaty regulates the future policy as regards naval bases in the Pacific.

The Four-Power Pact is the substitute for the Anglo-Japanese Alliance, which had served its original purpose and been most loyally observed by our ally, Japan.

The measure had to be carefully guarded, so as to avoid any feeling of breach of faith by Great Britain in appearing to desert her great ally, but as it was initially made for the preservation of peace in these waters, broadening its scope has increased its usefulness and promoted the desired aim. The new pact was accepted by the United States Senate with the necessary two-thirds majority, after agreeing to a Reservation made by Mr. Brandegee to respect the territorial integrity of the other signatories, and to confer in case of differences between the signatories. "The United States," it was declared, "understand that under the statement in the preamble or under this Treaty there is no commitment of armed force, no alliance, and no obligation to join in any defence."

THE *STATUS QUO* IN THE PACIFIC.

This Four-Power Pact is Article XIX. of the Treaty for the Limitation of Naval Armament, which is as follows:—

The United States, the British Empire, and Japan, agree that the *status quo* at the time of the signing of the present Treaty with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereafter:—

1. The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (*a*) those adjacent to the coast of the United States, Alaska, and the Panama Canal Zone, not including the Aleutian Islands, and (*b*) the Hawaiian Islands.

2. Hong Kong and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of meridian of 110° east longitude, except (*a*) those adjacent to the coast of Canada, (*b*) the Commonwealth of Australia and its territories, and (*c*) New Zealand.

3. The following insular territories and possessions of Japan in the Pacific Ocean, to wit, the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa, and the Pescadores, and any insular territories or possessions in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defences of the territories and possessions above specified. This restriction, however, does not preclude such repair and replacement of worn-out weapons and equipment as is customary in naval and military establishments in time of peace.

The Treaty remains in force until December, 1936, but is subject to suspension or termination under certain conditions.

The combination of (a) the Four-Power Pact, (b) the *status quo* as regards naval bases, and (c) the limitation of capital ships bringing to an end all rivalry in that respect must inevitably buttress the cause of peace in the Pacific. All the countries affected are relieved from certain apprehensions, not the least our great Dominions, Australia and New Zealand, which, being far removed from the Home country, are in a naval sense very isolated. It is thus hoped that these Dominions will continue to develop freely without the threat of outside interference. Money that it would have been necessary to expend in naval bases will have been saved.

The great breadth of the Pacific will separate the two principal countries—and this fact, in association with the reduction of capital ships, will remove the temptation to aggression and tend to preserve peace in the future, thus benefiting the peoples of all the nations.

The Nine-Power Treaty with China.

When the future of China was discussed, it became apparent that, from a naval point of view, the main issue was the handing back to China of the Shantung peninsula. This was amicably settled by the Japanese and Chinese delegations, the settlement of this rather intricate question reflecting great credit on Japanese statesmanship.

Lord Balfour was able in the name of the British Government to add a most gratifying sequel, viz.: the handing over or return of Wei-Hai-Wei to China. In doing so, he referred to the time now past when Russia and Germany were attempting more and more to dominate the Chinese Empire, and how, in order to bring some foreign equipoise to the assistance of China, an arrangement had been come to by which Great Britain secured the lease of Wei-Hai-Wei. The circumstances under which the port came under British control had now entirely disappeared, and, moreover, Shantung having been handed over to China, Great Britain proposed accordingly to hand over Wei-Hai-Wei. He spoke of this as "the crowning act," which happy expression was fully appreciated by all the delegates.

It may be remarked that the Anglo-Japanese Treaty had saved Great Britain from the necessity of sinking large sums of money in making Wei-Hai-Wei a fortified base, and during our lease only moderate sums of money had been spent in making it a health resort and exercising station for our ships in those waters. No doubt the Chinese Government will still welcome our ships there in the future.

Capital Ships *versus* Submarines.

So much for the work of the Washington Conference. By the terms of the Treaty, Great Britain is allowed to construct two capital ships of 35,000 tons to carry guns of not greater calibre than 16 in.

There have been since the Armistice repeated and varied attempts to depreciate the value of capital ships in view of their vulnerability

to air and submarine attack. This criticism is now directed against the building of these two ships.

In order to maintain a "One-Power Standard" in capital ships, their construction is essential. At the present moment, the United States possess 3 post-Jutland capital ships carrying 16-in. guns, and Japan 2, while Great Britain has only the Hood, a ship commenced before the battle of Jutland, which only carries guns of 15 in. calibre, besides not embodying the valuable experience obtained on that occasion. Thus, Great Britain has no capital ship carrying 16-in. guns, and has only 1 recent ship to take her place in the line of battle to 3 possessed by the United States and 2 by Japan.

One of the most important revelations during the war was the great superiority of a ship with large calibre guns over a ship with guns of less calibre. This, with the increasing range at which future naval actions will commence, renders it all the more desirable that these two new ships should be constructed.

It is most noteworthy that in the opinion of the senior officers of the maritime nations in command of fleets in the recent war, the capital ship still remains the bedrock on which all naval strength must be based. As the Grand Fleet controlled the movement of the High Sea Fleet in the recent war, so the battle fleet in the near future will render subsidiary movements either possible or impossible.

At the Conference, with the ablest statesmen present, assisted by the leading naval experts to advise them, the importance of capital ships was so evident that the standard for the relative naval strength was based on capital ships.

In the criticisms that are being made in this country, it seems at times to have been forgotten that the British Empire is essentially a world Power, and has to be prepared for risks outside or beyond Europe, *i.e.* in all the oceans of the world. In this connection it has not been stated how the advocates for aircraft propose to defend the ocean highways of the world, which are the life-blood of the Empire. It must be remembered that surface vessels have to carry our food, raw material, exports, and in war troops and munitions ; these will all require protection.

The late war showed that, however efficient submarines may be for offence, they are not suitable for the defence of surface vessels. It seems also to be forgotten that in order to use aircraft at a distance from the base, aircraft carriers, large vulnerable ships, must rely on the protection of surface vessels.

Broadly, so long as the construction and retention of battleships is continued by other nations, Great Britain must retain hers and have a force equal to that of any other nation.

The increasing menace from the air is fully appreciated, but surely to divert money that is essential to maintain a "One-Power Standard" from the Naval Estimates in order to manufacture aircraft, does not appear to be statesmanlike ; their functions are different, but both are vital in order to maintain the control of our oversea communications.

Lord Lee's Declaration.

In moving the second reading of the Washington Treaties Bill on June 20, 1922, Lord Lee of Fareham made the following remarks:—

They were the Treaties dealing with armament and the protection of non-combatants and neutrals at sea in time of war. The reason that nothing was said in the Bill as to noxious gases, was that the Governments concerned were bound by their signatures, and no legislation was required.

Under the Treaty for the limitation of naval armaments this country undoubtedly made at Washington a voluntary surrender of our historic supremacy on the sea, and it did it in the interests of world peace and of world solvency. It was a free-will offering certainly unparalleled in our history, if not in the history of the world, and one which was of epoch-making significance.

The basic principle was that we should accept a naval strength which was on an equality with the United States of America, with corresponding ratios with regard to other navies. This was not only a new orientation of naval strength, but it was a new portent of world politics and in the relations existing in future between the English-speaking peoples.

There was a spiritual as well as a material side to the Treaties, and the fact that the British Empire and the United States of America wholeheartedly and almost spontaneously agreed that their interests and the interests of the future peace and solvency of the world would be best safeguarded by sea power on the basis of equality between the British Empire and America was perhaps worth more to our security than any numerical margin of superiority in either ships or men. At any rate, they took this responsibility with their eyes open, fully realising that they were running thereby, at any rate, a theoretical risk.

The British Government had not only accepted these terms, but they were giving effect to them without waiting for ratification by the other signatory Powers, because without mutual confidence the agreements concluded at Washington would inevitably break down and the world would be thrown back once more into the welter of suspicion and naval shipbuilding, bringing them all inevitably to financial ruin.

To obviate any possible misunderstanding in America or elsewhere, he wished to point out that the Government and the Admiralty were already going ahead with reductions, both in ships and men, precisely as if the Treaties had already been ratified. Any attempt to alter the details of the Treaties would have an unfortunate effect in arousing suspicions and delaying the general agreement between the Powers. Some people had advised the Government to proceed more slowly, but it was unthinkable that any civilised nation would go back upon agreements come to so solemnly at Washington.

Remarks on the Treaties.

The greatest gain flowing from the Washington Conference has been that representatives of the five leading maritime nations have met and after full consideration of their views and apprehensions for the future safety of their countries, have been able to agree on some reduction in shipbuilding programmes.

A relative standard for capital ships has been laid down and accepted.

A limit of size of ships and of guns has been adopted, thus further reducing competition.

Cruisers have been limited in size and calibre of their guns.

Aircraft-carriers have also been limited in size, and a relative total tonnage for each nation has been settled.

The future of the Pacific has been fully considered and principles accepted which will materially decrease the chances of controversy or the temptation for aggression by any of the four Powers.

Great Britain, while still maintaining its most friendly relations with its former loyal ally, Japan, has entered into more satisfactory

relations with the United States by forming one of the four nations in the Pacific Pact.

No limit could be fixed for the total relative tonnage for auxiliary surface combatant ships; nor could a limit be found for submarines, and no limit of size or power was settled for individual submarine units. Thus rivalry in the dimensions and number of submarines is still possible.

Nations threatened by the submarine menace will still have to arrange for defence against this method of underwater attack. It would seem that, if agreement had been possible by the five Powers for a self-denying ordinance to have been signed for the total abolition of submarines, a further conference would have been necessary, which would have embraced all the maritime Powers of the world, before effective action could have been taken.

The abandonment of submarines by all Powers would have meant a great advance in civilised warfare, but the means of ensuring no breach of the Treaty by any Power fighting for its existence are not very evident.

The world has in the recent war received a great shock and set-back owing to the manner in which solemn Treaties entered into between nations were regarded as "scraps of paper," and the many breaches in both the Geneva and Hague Conventions that were made by Germany, without any possibility of being prevented, or of the delinquents being punished subsequently. In this connection, Bismarck's dictum should not be forgotten: "All great contracts between great states cease to be unconditional or binding as soon as they are tested by 'the struggle for existence.'"

Has the conscience of the world improved sufficiently to ensure the faith in Treaties being observed in extreme cases? Agreement has been arrived at by the five Powers and a Treaty signed to prevent the abuse of submarine attack on merchant ships, which should reduce the risks to which neutrals and non-combatants were exposed to from U-boats in the late war. All other civilised Powers are being invited to give their assent to these humane rules. It is hoped that these rules will be universally accepted and strictly adhered to in any future conflict.

Article V. of this same Treaty condemns the use in war of asphyxiating, poisonous, or other gases, and all analogous liquids, materials, or devices. It seems too soon to express an opinion on the probability of this humane and civilised policy being generally followed. For the sake of humanity and civilisation it is imperative; but again with our recent experience and in view of the rapid development of aircraft by all nations, one cannot be very sanguine.

The reduction in personnel caused by this limitation of armaments has been very considerable. The loyal manner in which these reductions have been accepted in the British Navy reflects great credit on that service. After a most strenuous and successful war, the number of officers and men whose naval careers have been ended suddenly in the full strength and prime of their manhood is pathetic, and calls for the sympathy and support of their fellow countrymen.

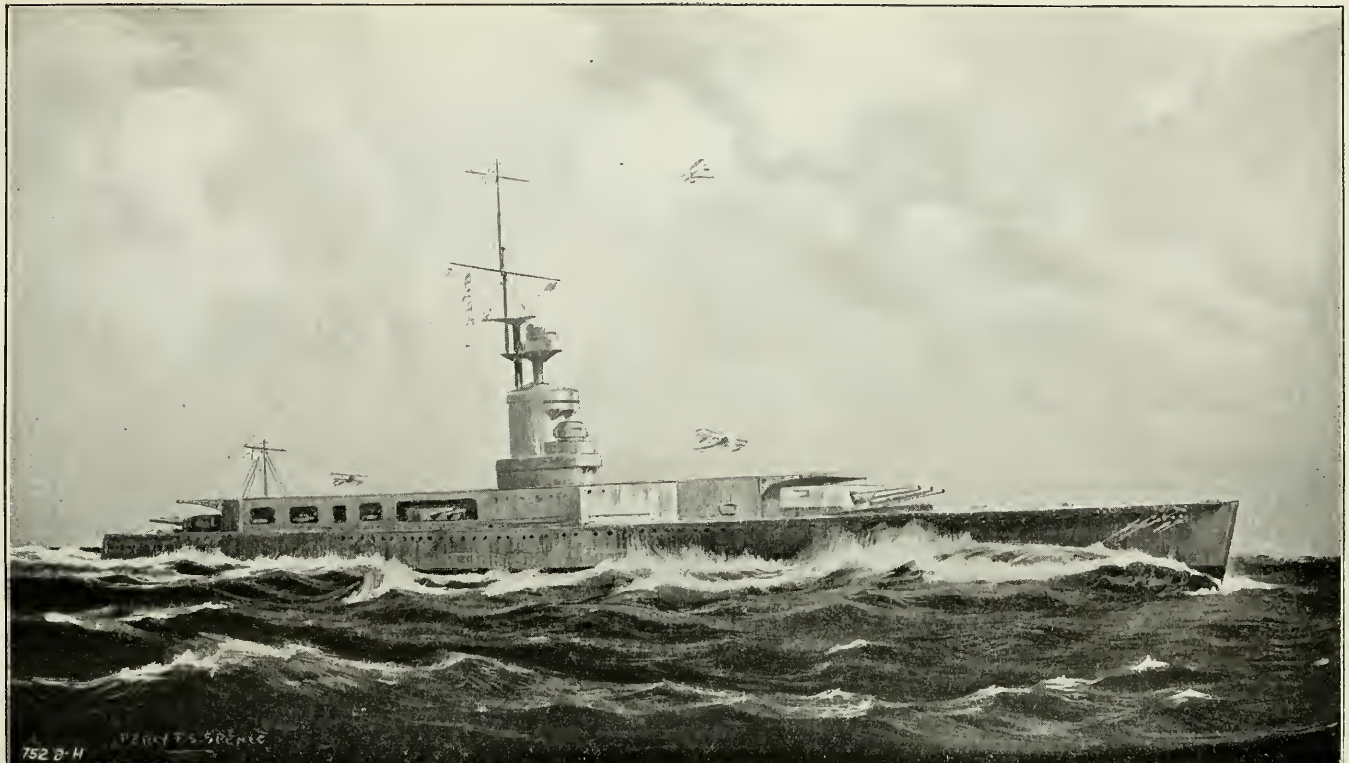
The reductions in naval strength and the policy of limitations

have further seriously affected the dockyards, arsenals, and armament firms.

Great credit is due to the initiators of the Conference and to all the leading statesmen who devoted so much time and thought to making the meeting a success. Considerable tact was necessary in order to secure a practical advance in limiting armaments.

Further progress in this good cause is still essential if the world is to be spared the horror of another world-war: this will necessitate a great deal of foresight on the part of the peoples of the civilised world, and a remembrance of the risks and dangers incurred owing to failure to face the threat to freedom and civilisation which the determined and continued policy of Germany so clearly indicated.

F. C. D. Sturdee.



(From a drawing by Percy F. S. Spence.)

DESIGN FOR EXPERIMENTAL BATTLESHIP.

(For particulars see p. 93.)

CHAPTER V.

The Influence of the Washington Conference on Naval Design.

Britain as a nation has accepted the proposals of the Washington Conference and regretfully one has to admit a large element of truth in the statement that this "signifies definite abandonment of the Two-Power standard and the consequent loss of British supremacy at sea." It is possible that circumstances entirely outside the good faith of the Washington contracting parties, and over which the Powers in the Pact have no control, may in the near future arise rendering nugatory the terms of the Washington Agreement, thereby forcing each and all of the contracting parties furiously to make up the deficiency caused by the scrapping of valuable warships and to overcome the delays in new construction and the inevitable inferiority of new ships to be built under the Pact owing to the displacement restriction. As the *German Gazette* observes, "the Washington Conference may prove a milestone to the next War."

The outstanding feature of the Washington Conference on the limitation of armaments is that it evolved one definite decision, namely, that naval power should be measured in terms of capital ships, and this notwithstanding the powerful opposition of critics of position and standing who maintain that the day of the battleship has gone by. Captain Guest, the Secretary of State for the Air, in March, 1922, said: "The defence of these islands has been entrusted to us. Aircraft is powerful enough, if sufficient in quantity, to defend our shores from invasion." Sir Percy Scott on March 24, 1922, wrote: "Naval strength is no longer measured by the number of battleships a country has, but by the number of aeroplane-carriers and aeroplanes." And yet a remarkable fact of the present position is that, notwithstanding the criticism which has been levelled against the retention of battleships, the majority of the great Naval Powers have come to the conclusion that battleships must be retained as forming the great bulwark of protection. Referring to the critics of the Navy, Lord Lee in April, 1922, said: "The battleship still remains the ultimate basis of sea power." Viscount Curzon on March 30, 1922, wrote: "The Cabinet Committee came definitely to the conclusion that the battleship of the post-Jutland type remained the unit on which sea power is built up. Both air and submarine arms were an essential part of the modern sea fleet; they were, however, additional to the battle fleet, and not a substitution for it."

The Washington Conference not only limited the total tonnage

strength of certain Powers in capital ships, viz.:—Great Britain and the United States 525,000 tons each, Japan 315,000 tons, and France and Italy 175,000 tons each, but also fixed the maximum displacement of the individual ship. To the naval architect and engineer this limitation in displacement is the most important result of the Conference and consideration of its influence on naval design is of primary importance to Britain. The maximum limit of the tonnage of capital ships to be constructed under the terms of the Conference is fixed at 35,000 tons, exclusive of fuel, equivalent to 37,000 tons on the United States full load displacement basis. The maximum calibre of the guns is fixed at 16 in.

In the "Annual" for 1920–21, I discussed at some length the principal characteristics necessary to be embodied in the capital ship of the future. The maximum limits of size and power were estimated, and were confirmed in certain particulars by the Admiralty designs submitted for tenders in September of last year and described more or less in detail by the First Lord. In the Admiralty design, due possibly to financial considerations and restrictions imposed by dock accommodation, the authorities did not avail themselves to the full of what was practically possible. Circumstances due to the Washington Conference render it unnecessary now to enter into any discussion with regard to the wisdom of that decision.

A Restriction on Scientific Achievement.

On the face of it, the Washington decision is an artificial restriction on the progress of scientific achievement. In order to utilise to the fullest extent the research work of recent years in gunnery, propelling machinery, and protection against torpedo attack combined with adequate protection against gun-fire and aerial attack, it was shown in the article referred to that it was essential to advance in the capital ship under present conditions to a displacement approximating to 57,000 tons. The Washington Conference restricts the battleship, under certain specified conditions, to a displacement not exceeding 35,000 tons. Obviously, this involves a sacrifice in one or more of the three principal factors of armament, speed, or protection, as it is impossible at once so to modify existing conditions as to make it possible to secure ideal qualities within the weights and dimensions now allotted. The weight restriction for the individual battleship will undoubtedly operate as an incentive to the production of maximum power within the limits assigned, and we may therefore look forward with confidence to some real development in ordnance and marine engineering within the ten years prescribed by the Washington Conference, but at the same time, we cannot ignore the fact that the restriction will, in the first instance, result in battleships whose offensive, defensive, and tactical powers will either individually or collectively be inferior to the qualities called for and possible in a post-war battleship. As one writer says: " . . . the battleship built to the new design will be lacking in practically every feature which the last war showed to be of practically vital importance." In dealing with battleship

design, more especially now when the displacement is limited, it is important to remember that, as pointed out by Rear-Admiral W. L. Rogers, U.S.N.: "Competent strength or endurance as a whole is not the sum of defensive and offensive powers, but is more in the nature of a product of these two factors . . . the defensive strength measures and prolongs the time element during which the offensive aggressive power is doing its work of destroying the enemy."

The Paramount Features of the Battleship.

The battleship of unfettered design is, in my opinion, not only "the unit on which sea power is built up" as expressed by the Naval Staff, but the unit upon which the very life of the Empire depends, and although, as Major L. Fea says: "the 35,000 tons of the Conference is not sufficient if the problem of the present-day battleship is to be solved without compromises"—there are certain paramount features which must be kept in mind whether the design is the 35,000 tons "Conference" type or one in which no artificial restrictions are imposed. Amongst these features are the following:—

1. The absolute necessity of high speed.
2. Main Armament of the largest possible range with an increased speed of loading and firing and greatly improved fire control and spotting.
3. An appreciable increase in thickness of horizontal protection in view of long-range action and aerial attack, with no decrease in vertical protection in view of possible close-range fighting.
4. An arrangement of underwater protection which keeps the vitals well away from the point of explosion, combined with
   - (*a*) A system of multiple watertight compartments, as in the warships of the U.S.A. or the later German battleships.
   - (*b*) A system of water transference from compartment to compartment, automatic as applied to transference from wing to wing, and mechanical with reference to the transference from end to end, as carried out more especially in the Russian Navy.
   - (*c*) A central control station for the instantaneous adjustment in case of damage to, and flooding of, an underwater compartment by the admission of a water compensating counter-weight in other compartments to minimise alteration to heel or trim.

The realisation of the ideal battleship has for the next ten years been ruled out of court by the Washington Pact and the improvements to be attained by the results of scientific achievement within the Conference period of ten years being problematical, all that can be done at the present time is to state the weight that can be allowed to each of the fighting factors and, by tracing the developments over the past ten years, arrive at some approximate idea of the probable changes on the assumption that the ascertained rate will be maintained. The difficulties of arriving at an estimate are increased because the very meagre naval building programme over the Conference period offers but little inducement to armament firms to incur the large expenditure necessary in carrying out research investigations.

The Armament.

In 1912 the calibre of British naval guns had advanced to 13·5 in.; since that date it has increased to 14 in., 15 in., 16 in. and

18 in. Progress was much accelerated during the war period, but it is unlikely, under peace conditions with the disadvantage already referred to, that that rate will be maintained. The problem in passing to a higher calibre is much simplified when the designer is not limited by a specified weight. An examination of the weights of guns and projectiles for the different calibres shows that they vary roughly as the cube of the calibre, indicating very little advance in the qualities of the materials of construction. Further, if we consider total armament weights for battleships with primary armaments varying from 12-in. to 16-in. guns it will be seen that these also follow a curve of the same order. Hence, it is clear that there is no immediate prospect of any appreciable reduction in the present weights of the primary guns and mountings, and the problem resolves itself into a consideration of the number which can be carried on the assigned displacement. As the maximum calibre of the primary gun has been fixed by the Washington Conference at 16 in., it may be safely concluded that the Conference capital ships will all be armed with guns of that diameter.

In the foregoing brief analysis of gun development, attention has been mainly confined to the British practice, up to and including the "Hood" class, of fitting the primary guns in twin mountings. Long after foreign navies had passed on to the triple mounting and overcome all the early difficulties attendant on its introduction, the British authorities clung to the twin mounting and this notwithstanding that ordnance designers in this country had had constructed to their designs satisfactory triple mountings for foreign Naval Powers. To compare the two systems it may be said at once that there is an appreciable advantage to be gained in weight by adopting the triple mountings, although the weights of the guns and ammunition remain constant. It is, of course, necessary to allow for the greatly increased turning moment due to the reaction of the fire of the outer guns, but it may be taken as approximately correct that three triple-mounted barbettes can be fitted on the same weight as four twin-mounted barbettes, conditionally on the total number of rounds for all guns remaining constant.

The value of secondary armament and torpedo equipment to a battleship under the new conditions of warfare is a matter for grave consideration, and I am in entire agreement with Major L. Fea, Royal Italian Navy, who, in his paper * read at the Paris Summer Meeting of the Institution of Naval Architects in July, 1922, gives it as his opinion that for the secondary armament it is necessary to have a single type of mounting, naval and anti-aircraft, with a calibre up to 6 in., thus uniting anti-aircraft and anti-submarine guns, all to have protective shields or their equivalents designed to ensure not only rapidity of fire, but to allow for the necessary elevation and depression. This, of necessity, considerably increases the weight of the secondary armament, but as the total weight of secondary armament and torpedo equipment bears but a low ratio to the displacement of the ship, possible variations in this factor cannot appreciably affect the main features of the problem.

* See *Engineering*, vol. cxiv, p. 29 (July 7, 1922).

The number of guns comprised in the secondary armament may possibly be reduced after an experimental period if it is proved that the defensive properties of the armaments of the accompanying light cruisers and destroyers warrant it.

With reference to torpedo equipment, there is no evidence that this, as applied to battleships or battle-cruisers, had the remotest influence on the tactics or results of any naval battle in the late War, nor apparently is there a single hit recorded on any enemy craft from such equipment. In view of this, it appears to me that the fitting of torpedo equipment to either battleships or battle-cruisers is an entirely useless and expensive luxury, useless in the fullest sense of the word and costly not only in sterling, but in the occupation of valuable underwater space.

Propelling Machinery.

The development in steam generators and turbine-propelling machinery during the last ten years has been a remarkable one. In the "Iron Duke" class, 1911–12, the total S.H.P. was 29,000, the boilers were coal burning but adapted for oil. The heating surface per S.H.P. varied between 2·4 and 2·2 square feet, and the steam consumption averaged 13·25 lbs. per S.H.P. per hour. The machinery installation approximated to 12·9 shaft horse-power per ton of weight. At the end of 1921, the corresponding figures were: 1·125 square feet of heating surface per S.H.P., the steam consumption for all purposes was 9·75 lbs. per S.H.P. per hour and 29 S.H.P. was developed per ton of the weight of the machinery installation, the boilers being oil burning only. How far this progress in steam turbine installation will be maintained in the next decade is a matter of conjecture, for the reduction in weight has been due largely to the adoption of small tube oil-fired boilers, the power developed per ton of weight showing no appreciable increase during the last four years of the period under consideration.

With regard to other forms of motive power—electric drive and internal combustion engines—very considerable progress is essential if they are to compete on equal terms with the steam turbine. Weight considerations are now more important than ever, so that any new or modified form of motive power likely to give the same efficiency on a smaller installation weight, or a smaller fuel consumption, is certain of careful consideration by those responsible for warship design. At the same time, designers would hesitate to jeopardise fighting efficiency by installing new systems of motive power purporting to secure a reduced cost of maintenance or weight unless there was a reasonable possibility of such promise materialising. The substitution for steam-driven turbines of a new or modified type may possibly result in increased radius of action, but that factor does not enter into the question of the possibilities of the present specified 35,000-ton ship.

The question of electric drive must, however, receive very serious consideration. It may not as yet have proved to be more economical than steam turbine machinery with respect to total weight or space, but it undoubtedly lends itself to a distribution of the machinery

which allows it to be kept further away from the sides of the ship and therefore further away from the point of underwater attack, and cases will no doubt arise where it will be adopted for the advantages it possesses in this respect.

Protection.

In a consideration of the armour and protection of the future ship the position can be more definitely stated. During the period between the designing of the Queen Elizabeth and the Hood, the percentages of displacement allotted to protection varied from 31 to 33·5. The experience gained at Jutland and the progress in aircraft construction calls for a high percentage of armoured protection and any reduction made in this percentage for the purpose of increased speed or armament must be arranged for by unequal distribution of thickness or weight of armour in accordance with the value of the principal units to be protected, viz., magazines, machinery, etc. The maximum protection figure for the future battleship will probably be about 35 per cent., and for the purpose of this chapter it is assumed that the armour and protection of the 35,000-ton battleship will approximate to 12,250 tons.

The Allocation of Tonnage.

The usual percentage of legend displacement required for the hull and fittings of this type of ship varies between 32·5 and 36. This item depends on the materials of construction, and there are no present indications of the possibility of using a lighter material of equivalent strength. For the immediate effect on naval designs of the Washington Agreement it may be taken that the percentage given for the Hood will represent approximately the proportion necessary for the hull and fittings of the battleship in question. With this assumption, the hull and fittings demand 12,600 tons of the legend displacement of 35,000 tons.

The percentage of legend displacement required for equipment varies between 2 and 3, falling slightly with increased displacement. No appreciable error is involved if for the present purpose the figure of 1,000 tons is assumed.

The weight of fuel carried in the normal condition is generally in the vicinity of 2½ to 3 per cent. of the legend displacement; in the present instance we may take 1,000 tons as a fair allowance. As the Washington Conference Standard Displacement does not include fuel, it is necessary to add 1,000 tons for fuel allowance, making a total British legend displacement of 36,000 tons.

Of the six factors which contribute to the legend displacement of the 35,000-ton "Conference battleship," *i.e.* the 36,000-ton British legend battleship, definite weights have now been assigned to four:—

1 Armour and protection	12,250 tons
2. Hull and fittings	12,600 ,,
3. Equipment	1,000 ,,
4. Legend fuel.	1,000 ,,
	26,850 ,,

leaving 9,150 tons to be assigned to armament and propelling machinery.

With reference to items 1 and 2, the line of demarcation between structural weight and protection depends largely on the calculator; any reduction in the one is accompanied by an equal increase in the other. Whatever method is employed the sum total of the weights of those two factors does not result in any important variation.

Reference to the tables of armament weights and machinery weights on pages 78 and 79, respectively, of the "Annual" of 1920–21 will at once show the possibilities of distribution of the 9,150 tons now left for disposal. The armament weights are tabulated for primary guns twin-mounted and arranged in 4 barbettes in accordance with British practice up to and including the "Hood" class, and these weights include an allowance for the secondary armament. If, therefore, it is desired to retain eight 16-in. 45 calibre guns twin-mounted with the usual proportion of secondary armament and ammunition, or as an alternative nine 16-in. 45 calibre guns triple-mounted, approximately 7,000 tons will be required, which leaves about 2,150 tons available for propelling machinery.

Allowing for auxiliaries, etc., the S.H.P. corresponding to the available weight of 2,150 tons is approximately 55,000, which would give a speed of about 24 knots on a displacement of 36,000 tons in the trial condition.

In this estimate of what may be termed the "Washington Conference" capital ship, the armament weight has been taken from my article in the "Annual" of 1920–21. It has already been shown that 9 triple-mounted guns may be fitted in lieu of 8 twin-mounted guns provided that the total number of rounds for the primary guns is not exceeded, so that in view of the advantages of disposition, accompanied by a 12½ per cent. increase in broadside fire and a 50 per cent. increase in ahead fire in the fitting of triple-mounted primary guns in 3 barbettes, as compared with twin-mounted guns, we may consider their adoption as inevitable.

Dimensions of the Ship.

With the completion of our approximate estimate of the weights which may be applied to each factor in a new type of capital ship, with moderate speed, I pass to a rough approximation of the dimensions. On the specified displacement and with the much reduced machinery spaces due to the retention of the maximum gun power and protection, the restrictions hitherto imposed on the design of the ideal battleship by our dock accommodation are no longer of immediate importance, for the breadth given to H.M.S. Hood will in the new type afford provision for reasonable protection against torpedo attack. For the purpose of calculation I will, therefore, assume the beam as 104 ft. Then, with a draught of 28 ft. 6 in., and lines similar to the Hood, the length between perpendiculars need not exceed 700 ft.

From this it is possible to tabulate the approximate general particulars of a 35,000-ton capital ship to meet the Conference conditions. In dealing, however, with the limit imposed of 35,000 tons

very careful consideration has to be given to the question of type to be ultimately evolved under artificial restriction. The three signatories to the Washington Pact have each apparently a free hand to incorporate in the 35,000-ton displacement whatever their Naval authorities may determine as the potent factors in the design and must decide whether, within the 35,000 tons, they should include: (*a*) the greatest number of large calibre guns with the maximum amount of protection and a speed, which although higher than that of pre-war battleships, would, under present circumstances, be considered moderate, or (*b*) high speed and adequate armour and underwater protection involving a main armament of the largest calibre guns allowed under the Pact, restricted in number to accommodate the Conference displacement, or (*c*) high speed with the maximum number of the largest calibre guns and the armoured hull protection much reduced.

Design where Gun-Power Predominates.

Some of the Powers concerned will undoubtedly arrange for a very high speed, others for maximum offensive and defensive powers involving sacrifice in the speed factor, and it may be as well, in the first place, to tabulate here particulars of the probable type (*a*) to be adopted where a maximum of armament and protection is decided upon :—

Length	700 ft. 0 in.
Breadth	104 ft. 0 in.
Draught	28 ft. 6 in.
Displacement (Conference) . . .	35,000 tons
Displacement inclusive of 1,000 tons fuel for trial condition . . .	36,000 tons
S.H.P.	55,000
Speed in knots	24
Primary armament	nine 16-in. 45 calibre guns, triple-mounted.
Secondary armament	twelve 5·5-in. or 6-in. guns and the usual anti-aircraft guns, etc.
Armour on sides and decks . . .	15 in., 14 in., 13 in., 7 in., 5 in.
,, ,, gun positions	16 in. to 10 in.

A sketch of this design is given on the Plate facing page 1.

In the disposition of the primary guns it may be assumed, with a fair degree of accuracy, that in accordance with modern ideas on this subject all barbettes will be placed forward of the machinery spaces. One of these barbettes, the second or third from forward, will be of the superimposed type to admit of six guns firing direct ahead at fighting range, preference being given to the second as allowing a considerable increase in training abaft the beam. The secondary armament will be disposed in convenient positions amidships.

Designs where High Speed is the Important Factor.

Having dealt with the question of design on the principle of giving first importance to armament and protection as referred to under item (*a*), it is important to consider the alternative proposals

(*b*) and (*c*) also referred to, in which high speed is an important factor. In my opinion, high speed is of very vital importance to nations whose naval actions are as likely to take place in foreign waters as in the immediate vicinity of their home coastal line.

The following are approximate particulars of the alternatives (*b*) and (*c*), proposal (*b*) having adequate armoured protection with reduced armament, and (*c*) maximum armament with the armoured protection considerably reduced.

	Alternative "*b*."	Alternative "*c*."
Length	730 ft.	770 ft.
Breadth	104 ft.	104 ft.
Draught	27 ft. 9 in.	26 ft. 6 in.
Displacement (Conference)	35,000 tons	35,000 tons
Displacement inclusive of 1,000 tons fuel for trial condition	36,000 tons	36,000 tons
S.H.P.	125,000	120,000
Speed in knots	30	30
Primary Armament	Six 16-in. 45 cal. guns, triple-mounted.	Nine 16-in. 45 cal. guns, triple-mounted.
Secondary Armament	Twelve 5·5-in. or 6-in. guns, and the usual anti-aircraft guns, etc.	Twelve 5·5-in. or 6-in. guns, and the usual anti-aircraft guns, etc.
Armour on sides and decks	13 in., 10 in., 7 in. and 5 in.	8 in., 6 in., 7 in.
Armour on gun position	14 in. to 10 in.	12 in. to 10 in.

An illustration of the "*b*" type is given on the Plate facing page 11. The "*c*" type is similar in appearance to that in the sketch on the Plate facing page 1.

With respect to arrangement (*c*), it is, of course, unlikely that any battleship would be constructed on these lines, as the protection has been largely sacrificed to speed and armament; it is simply given as an illustration of the result to be expected when two main factors are maintained intact at the expense of the third.

An "Experimental" Battleship.

Before leaving the question of the "Washington Conference" type capital ship it may be of interest to consider a special type as an experiment, seeing that the exceedingly small number of capital ships to be constructed during the next ten years cannot appreciably affect the relative positions of the contracting Powers.

The type in question with a speed exceeding 30 knots would be provided with a maximum of vertical and horizontal armoured protection, including the fullest underwater protection. The main armament would consist of three 16-in. guns triple-mounted in a barbette forward. The auxiliary armament would consist of, say, 6 twin-mounted 7½-in. or 8-in. guns, together with a certain number of 4·7-in., or 6-in. anti-aircraft guns on disappearing mounts.

The vessel would, so far as the arrangement of armament allowed, be fitted as a carrier for aircraft, such craft being purely for the purpose of her own defence and action. This solitary and powerful unit could, if required, take her place in the fighting line

as part of a battle fleet, or, in emergency, be despatched to foreign stations, possessing high speed and fully equipped as regards armament and protection. Dispensing with the usual protection afforded by accompanying craft and aeroplanes, she would carry within her the 'planes necessary for scouting, or torpedo and bomb dropping, and her upper or superstructure deck would be constructed without obstacles for the launching and return of her aircraft. To effect this her general appearance and arrangement as a capital ship would be materially altered, the funnels and deck casings would entirely disappear, and the smoke and other products of combustion be conducted overboard through ducts swept by the water from the circulating pumps and other sources. Such an arrangement is not at all an impossible one, although, naturally, experiments during construction would be necessary and desirable, and in the case where, as might be anticipated, objection should be raised, from conservative sources, to such a method of disposing of the products of combustion, there would, as an alternative, be ample room to erect funnels on each side of the vessel rather than on the centre line, and so still maintain the required clear deck space; funnels, however, create serious air disturbances and make safe landings difficult, and the absence of funnels would have the additional advantage of allowing the anti-aircraft guns to be sighted and used without the interference from smoke and the vibrations of heat exhalation which are the principal disadvantages of present arrangements.

The appearance of such a vessel is shown on the Plate facing page 85, and allows for a clear landing space abaft the mast of about 300 ft., whilst forward of the conning tower, the 'planes would be delivered from the deck below to the superstructure deck by means of the usual lift, and have a clear run of about 120 ft. for getting off. The fitting of disappearing anti-aircraft guns would allow practically the whole of the deck to be without obstruction.

The advantages of the type are obvious. In the first place, such a vessel joining in a naval action where the issue hangs in the balance, might prove the determining factor; on the other hand, her great speed and powerful artillery would enable her to account for any opposing cruiser or cruisers, however powerful, which she might encounter during the course of a naval war. It is unnecessary to enter into details and dimensions excepting to say that such a vessel could be constructed within the 35,000 tons limit. The adoption of such type would necessarily mean the acceptance of a considerably reduced offensive power, and could only be justified if forming a connecting link in strategical or tactical requirements.

The foregoing outlines the effect of the Washington Conference limitations on capital ships only. The limitations in total tonnage of the battleship squadrons must seriously affect the building of the battle-cruiser type, for to include such type in the Battle Fleet involves a heavy sacrifice in primary armament.

In the naval battles of the future it is evident that contact with the enemy is likely, in the first place, to be made by the use of aircraft or light cruiser squadrons, and one writer goes so far as to say: "It is possible that future naval engagements will begin with torpedo

aircraft attack while the opposing fleets are still several hundreds of miles apart."

Future developments will proceed on scientific lines. The ratio of power to mass will show a progressive increase. In ordnance, researches will be undertaken for the discovery of more powerful forms of propellants, in marine engineering still greater efforts will be made to increase the shaft horse-power per ton of weight of machinery, in shipwork rigid economy of weight will be exercised by greater efficiency in the distribution of the structural material and in the elimination of non-essential parts, and, in all branches of naval engineering, common ground will be found in the quest of some new material which shall combine lightness with the indispensable qualities of strength and elasticity. The results of successful effort in these directions will not be limited to the machinery of war, but will be reflected in our merchant marine in higher deadweight capacity, greater economy in working costs, and lower freight charges.

The Auxiliary Ships of a Fleet.

The Washington Agreement divides naval units, other than capital ships, into three classes:—(1) Auxiliary surface combatant craft. (2) Submarines. (3) Airplane-carriers and aircraft.

The first includes light cruisers, flotilla leaders, destroyers, and all other surface types except those particularly specified. Among these exceptions are existing monitors, fuel ships, supply ships, tenders, repair ships, tugs, mine-sweepers, and other types readily convertible from merchant vessels, but all new auxiliary combatant craft over 3,000 tons with a speed of 15 knots and carrying more than four 5-in. guns, are to fall within the scope of the Agreement limiting the total tonnage of auxiliary surface combatant craft. The displacement of any single unit in this class is not to exceed 10,000 tons, whilst provision is made that no gun with a calibre in excess of 8 in. is to be carried.

This limitation of tonnage may possibly affect the design features of each of the types included in these classes, but before anything definite can be said as to this, the naval strategist and tactician must have determined not only the particular types of auxiliary surface craft required, but also the number and tonnage which must be devoted to each type for the purpose of maintaining adequate sea-going training for the personnel and to ensure progress in modern devices and methods of warfare.

The 10,000-ton "Washington Conference" Cruiser.

I do not purpose to treat in detail the probable designs of the types included in this class. Apparently the Washington Conference did not anticipate any changes of sufficient importance to warrant any limitation in the individual unit of the "cruiser" class except in the displacement, which is limited to 10,000 tons, and in the calibre of the guns, which is limited to 8 in. Among existing light cruisers of

recent construction there is a very wide range in size. They may be grouped in three main types of similar protective qualities, but varying in armament and, to a lesser degree, in speed. The main protective belt in each of the three cases is 120 lbs., the speed of the "E" class is 33 knots, of the "Raleigh" class 30 knots, and of the "Courageous" class 32 knots, while the main armaments are seven 6-in., seven 7·5-in., and four 15-in., respectively. So much adverse criticism has been directed against the "Courageous" type that it may be safely predicted that the design will not be repeated. The remaining two types will probably be renewed as required under the terms of the Agreement without any striking modification in details. The "Raleigh" class compares very favourably with the latest practice of the United States and Japan in all respects other than speed, which, for these two countries, has risen to 33½ knots. It was reported in June, 1922, that included in the new Japanese programme were four 10,000-ton cruisers, four 7,000 tonners, and twenty-four 1,500 tonners.

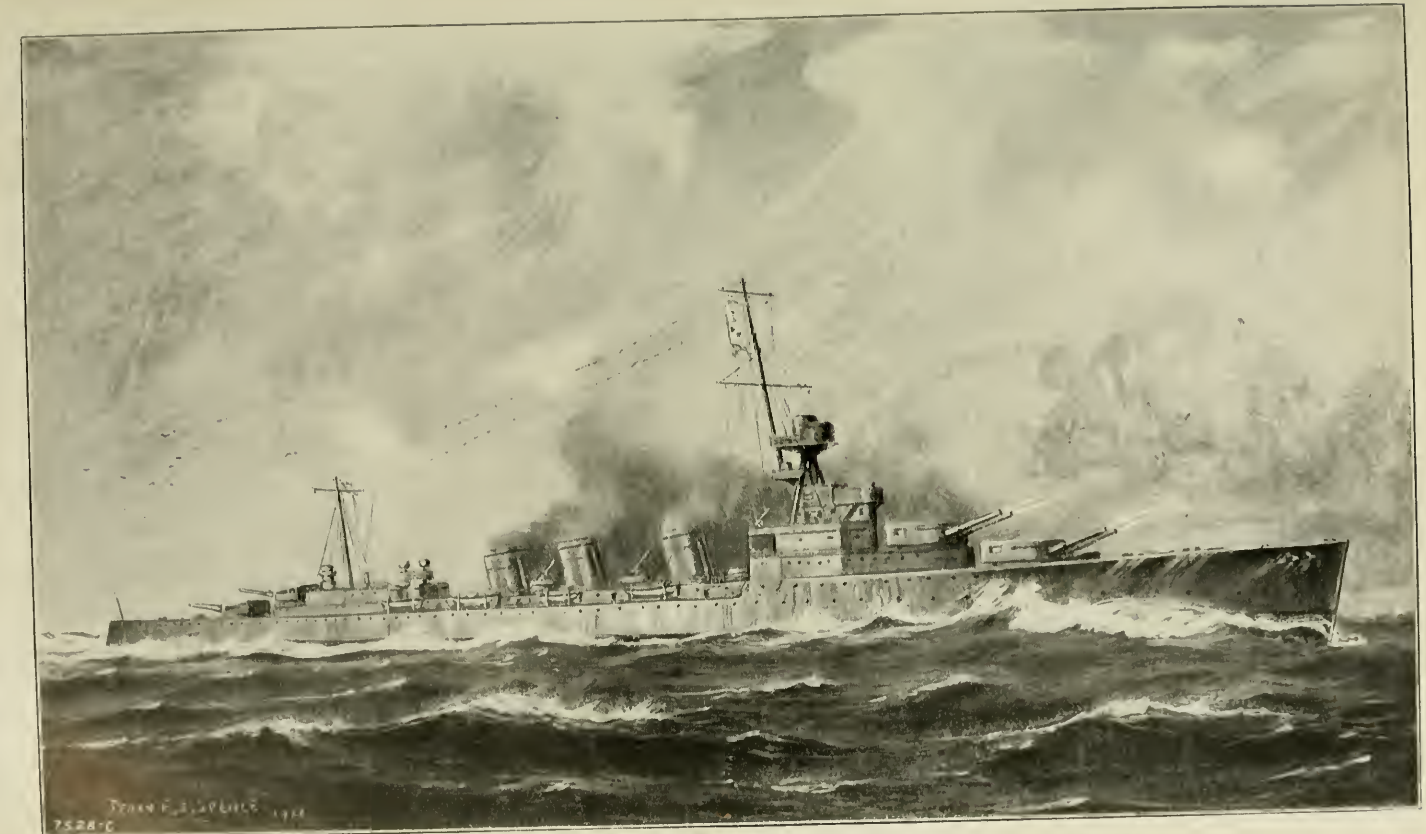
Light Cruiser Design.

In this chapter, which deals more especially with capital ships, space does not allow of a lengthy examination of cruiser possibilities and design. The sketch on the Plate facing this page, shows the arrangement of a cruiser which, whilst meeting all the requirements of the Washington Conference, indicates an advance on anything in the way of armament and speed hitherto embodied in the usual "cruiser" type (I advisedly omit the "Courageous" type) up to the present time. This proposed cruiser, on a displacement within 10,000 tons, is capable of carrying eight 7½-in. or 8-in. guns twin-mounted in barbettes on the centre line, 2 forward and 2 aft, and an auxiliary armament of 4-in. high-angle guns suitably placed, and is capable of maintaining a speed of not less than 34 knots. The protection in every particular is equivalent to the protection of cruisers of this type built or building. As it is quite possible satisfactorily to embody all these features in a design of such displacement, it appears to me that anything short of this should not be accepted by any first-class Power under present conditions.

Submarines.

I have already indicated in a previous article * that the surface speed of the submarine under present engineering conditions had been pushed to the limit in the 24-knot "K" class, which makes it unlikely that they will take part in a conflict between cruisers; such action will be more in the nature of a contest at sea between individual units, where the tactical factor does not achieve the same degree of importance as in a fleet action. Under these circumstances it does not appear imperative to pass beyond the present cruiser speed of about 30 knots with the concomitant increase of displacement or reduction in gun armament. The new conditions demand

* In the "Annual" for 1920-1, p. 70.



(From a drawing by Percy F. S. Spence.)

DESIGN OF LIGHT CRUISER TO MEET WASHINGTON CONFERENCE CONDITIONS.

(For particulars see p. 96.)

that every new vessel should be considered primarily from the point of view of its value to the battle fleet. No sacrifice in tonnage or armament of auxiliary combatant craft should be entertained for secondary purposes unless as a precautionary measure to meet possible future contingencies. In flotilla leaders and destroyers our latest types are fully equal to all demands of the fleet in action, and their design will probably not be appreciably influenced by any conceivable change in the capital ship of the immediate future.

In submarine tonnage the allocations under the Washington Agreement are as follows: United States, 90,000 tons; Great Britain, 90,000 tons; Japan, 48,000 tons. The tonnage agreed for this country corresponds approximately to the existing position. It is sufficient to give us 90 to 100 submarines of the " L " type. According to a report from Japan in June, 1922, their new programme will include at least 28 submarines. My opinion of submarines with high surface speed, and consequent large displacement, has been stated in a previous contribution,* and later considerations tend to confirm what was written on the subject. Until some system of propulsion can be devised which is operative with the vessel on the surface and in the submerged condition, no appreciable progress in design can be looked for.

It may be instanced here that in order to test the possibilities in this direction much consideration has been given to designs and certain experiments have been made recently by Vickers which show that it is quite possible to construct a useful and formidable, though small, type of Coastal Submarine, fitted with single unit propelling machinery for all conditions and having good radius of action. The advantages of practically instant diving at any time during patrol work, without the necessity of changing over from one set of propelling plant to another, may be considerable in the future; it is also a step in the direction of the ideal Coast or Harbour Defence Submarine.

With respect to the construction of submarines, it will be remembered that Lord Lee at the Washington Conference urged the total abolition of the submarine from the sea, but largely owing to French views in this matter he was not successful in his efforts. Admiral Moreau, defending the French point of view in March, 1922, pointed out that with 90,000 tons of submarines, 90 submarines in all, which would only allow of 20 being kept at sea at once, France could not even assure the defence of the 24,000 kilometres coast-line of France and her colonies.

In dealing with the question of submarines, it would be well to bear in mind the remarks of Commander Carlyon Bellairs, M.P., who in April, 1922, wrote: "The submarine is at a disadvantage in mobility, defensive qualities, and sea-keeping capacity. Submerged she suffers from lack of vision, and if she fights on the surface her case is hopeless."

* In the "Annual" for 1920–21, p. 74.

Aircraft Carriers.

With regard to aircraft-carriers, the following limits are fixed: Great Britain, 135,000 tons; United States, 135,000 tons; Japan, 81,000 tons; France, 60,000 tons; Italy, 60,000 tons. No aircraft-carrier is to exceed 27,000 tons displacement, except that any one Power may build not more than two such carriers with a displacement of 33,000 tons, the calibre of any guns carried being restricted to 8 in. Within the above limit for total tonnage the naval designer is free to exercise his ingenuity respecting the character of the ship for this particular purpose. Our present aircraft-carriers were mainly produced under the stress of war, but only one of the number—the Hermes—was actually made the subject of a special design. Hence, it cannot be expected that any unity of character can be traced in an analysis of their leading particulars. They vary widely in speed, armament, protection, and carrying capacity. The novel features in the construction of the larger vessels have been published more or less fully in the technical press The type is in process of evolution, its future depends on sea experience with existing types, and on the progress in aircraft construction respecting range and offensive power. Its functions demand that its speed shall be sufficient to enable it to operate effectively with the battle fleet, its armament should be equal to that of the latest type of light cruiser, its main above-water protection should not be less than 120 lbs. and its underwater protection should compare favourably with that of the capital ship. No definite rule can be laid down regarding the carrying capacity. It will vary with the type, weight, and dimensions of the aircraft and the purpose for which these are intended. As in the case of the light cruisers, the altered conditions make it imperative that the ruling principle in all new construction should be the effective co-operation of every unit with the battle fleet, and it would be false economy to sacrifice this principle to any secondary consideration, such as carrying out duties which could be performed by an inferior unit. The dimensions of the aircraft-carrier must necessarily be large, and the Hermes may be taken as embodying, under present-day conditions, the minimum essentials of the type. The acceptance of this standard would mean the scrapping or re-conversion of several existing carriers and their replacement, within the terms of the Agreement, by new vessels of at least equivalent qualities to those of the Hermes.

A most essential requirement in our aircraft-carriers is steadiness of platform, as pitching, rolling, and ascending renders very difficult the duties to be carried out. A great number of experiments are being carried out with gyros, anti-rolling tanks, and special forms of hull to promote necessary steadiness, with a large measure of success.

Conclusion.

This outline of the effect of the Washington Conference on naval construction calls for some reference to its incidence on the national resources in time of need. To the nations of the world suffering

under the heavy burden of taxation imposed by the great war, this limitation of armaments comes as a welcome relief, and by many is looked upon as the beginning of ultimate complete disarmament. That is to press an epoch-making achievement beyond the present range of vision. Viewed in the right perspective its importance is undeniable. It tends to relieve the burdens of peace by limiting naval competition and a strict adherence to the terms of the Conference will remove, to a large extent, grounds for suspicion that a nation is preparing for war. On the other hand must be put the fact that no step has been taken towards the limitation of armies or of the air forces. No practical proposition has yet been found for the compulsory settlement by arbitration of the disputes which arise from time to time between the various nations, nor apparently has any provision been made for the possibility of Greece, Russia, China, the South-American Republics, the Maritime Nations of the Baltic and others constructing naval elements which in a combine, or series of combines, might menace the safety of the Empire. Until something definite has been accomplished in that direction it is undoubtedly essential in the interests of this country that its resources should be maintained to such extent as to be effective and adequate to meet all reasonable emergencies.

The small naval programme of the next ten years offers no inducement whatever to large armament firms to maintain costly plants and staff over that period, and one is bound to inquire how the country will stand if within that period war on a large scale should again have to be faced, when the war-time installations and equipments of such firms will have been depleted and their staffs of requisite experience have been dispersed. From the point of view of present-day economy the policy may be right. From the point of view of the safety of the Empire it is a dangerous expedient. It is for those who, in the interests of economy and peace, have suggested and agreed to such arrangements also to provide a way whereby, notwithstanding these, the life and security of the Empire is assured.

George Thurston.

CHAPTER VI.

The French Navy in the War and after the War.

When the war broke out, the French Navy consisted of 21 battleships, of which only 4 were modern; 18 armoured cruisers, all of them old; 13 light cruisers, all old also; 99 destroyers and 46 submarines. The major part of these units, conformably to the plan of mobilisation, was concentrated in the Mediterranean, there being in the northern waters only one division of old cruisers, formed of the Marseillaise, Gloire, and Amiral Aube, which was then in Cherbourg, under the command of Rear-Admiral Rouyer, and which was strengthened by a division of training-cruisers consisting of the Jeanne-d'Arc, Dupetit-Thouars, and Gueydon, equally ancient. Such was, with the addition of a few torpedo boats and submarines, the naval force which France had at her disposal for resisting a first encounter with the German High Seas Fleet! Nevertheless, on August 3, 1914, the Minister of Marine telegraphed to this *escadre pour rire* the dignified order "to get under way and to prevent by force of arms the passage of the Channel." This meant certain death, but the staffs and crews followed the order to the letter and to a man, and when Rear-Admiral Rouyer got under steam at midnight on August 3 it would have gone ill with anyone who had ventured to tell the crews of these old units that the German Fleet would make but one mouthful of them; the 6 cruisers steered their course under all their low speed and the most complete enthusiasm prevailed. Valour is occasionally rewarded; on the following day Great Britain entered the lists, and an agreement, arrived at on August 6, assigned the Mediterranean as the field of action of the French Fleet, under the command of Admiral de Lapeyrère.

It is not within the scope of this chapter to state in detail the part played by the French Navy during the war, but rather to recall the fact that in the summer and autumn of 1914 the rush of the German armies on land was of a violence such as to compel France to devote absolutely the whole of her energies to military problems, quite apart from purely naval ones. The French Navy, therefore, fully trusting in the support afforded by the British Navy, placed all the naval arsenals of the country, their engineers and staff, at the entire disposal of the High Military Command for the manufacture of war material; the coast defence guns were removed and sent to the Front, and a portion even of the ships' crews was also transferred to the land armies. At Dixmude, the Ronarch brigade afforded a proof of the bravery of the French sailor on land as on the seas. Emphasis should be laid on this circumstance, which led the French

Navy, of necessity, to forego its calling and to become an auxiliary of the land armies, for saving the country by aiding in stemming the invasion; from the period at which this took place dates the cessation of naval construction in France. There were on the stocks at the time 5 battleships, as well as several destroyers and submarines in course of completion. Work on these was stopped, since the most urgent task was to repel the invaders.

Anti-Submarine Measures.

Moreover, the French Navy early in the day had no further need to consider the eventuality of squadron engagements, its rôle being in principle limited to the Mediterranean. On the other hand, it had to organise action against submarine attacks, not only in the Mediterranean, but also in the Channel and on the Atlantic. The work it carried out in this connection was considerable, since, down to the Armistice, the French Navy armed with guns 1,138 merchant vessels, and had available against submarine attack 134 destroyers and torpedo boats, 61 gunboats, sloops, and yachts equipped for war, 134 patrol boats, 84 submarine chasers, 248 trawlers, 157 other trawling units, etc., forming a disparate collection of small craft of every age and type, assembled under the greatest difficulties, and which, on peace being declared, were to return to the merchant or fishing services, but whose aid in 1917 and 1918 was far from being negligible.

When peace was signed, the French Navy was weaker, as compared with 1914, by 4 battleships, 5 armoured cruisers, 13 destroyers, and 11 submarines. The battleships and armoured cruisers lost were, in reality, of little military value. Taking into account a number of destroyers acquired or completed, besides a small number of submarines built under great difficulties, it may be stated that the post-war tonnage of the French Navy was about 22 per cent. less than the tonnage of 1914. The post-war tonnage comprised no new line-of-battle unit; the flotillas of smaller ships had not been increased to any marked extent; and all the units, whatever their class, showed the effects of the intensive service they had been subjected to (12 destroyers had immediately to be scrapped), the remainder consisting mainly of material for the ship-breaker.

After the War.

After the Armistice, the French Navy remained for some time on a relatively high expenditure footing. Admiral de Bon, formerly Chief of the General Headquarters Staff, was called to the command of the Mediterranean Fleet, which consisted of numerous units. The transport of Russian emigrants called for the maintenance in the Black Sea of an important division. Moreover, wartime practice and routine still prevailed. But the unsatisfactory financial situation of the country on the one hand, and, on the other, deterioration in the morale of part of the crews, particularly in the case of those in service in the Black Sea, rendered immediate steps necessary. Ships were gradually removed from commission, complements were

decreased, and the Navy "was put to sleep." Parliament, further, insisted upon economy, and, as is the case only too often in France, the budget of the Navy was cut down more severely than that of any other Department. Both Chambers continued to vote heavy credits for the Army, whilst Naval expenditure was immediately restricted. From this period (1920) dates the final abandonment of the building of the five 25,000-ton battleships, Flandre, Gascogne, Normandie, Languedoc, and Bearn, which had been ordered in 1913; it was decided that the Bearn alone should be transformed for the Aviation Service. On the basis of the former programmes, four 30,000-ton battleships would have been laid down in 1915, and two more in 1917; the plans for these were ready. The project was abandoned.

Notwithstanding the above, in words, but in words only, the necessity was proclaimed of not jeopardising the Navy and a programme of new ships was drafted and presented to Parliament at the commencement of 1920 by M. Georges Leygues, Marine Minister at that time. In support of his scheme, M. Leygues made a most clear and forcible statement. "As a primary consequence of the late war," he said, "the seas are in future to be the arena in which international activities will be developed; and we in France are compelled to work up and make use of the possibilities which the war has created and has also multiplied. . . . According as France follows a policy of activity or of effacement in naval matters, so will the consequences be favourable or unfavourable to her." This was followed by a detailed review made by the Minister of Marine of every naval need in every sea and at every point of the globe. The logical conclusion of such weighty considerations would have been to claim the building of numerous ships of every class. Such was not the case, and M. Leygues limited his naval programme, asking sanction merely for the construction of 6 scouting ships and 12 torpedo boats. The mountain simply gave birth to a mouse! Notwithstanding the paucity of this list, it took the Chambers two years to look into the "programme," and this was voted in 1922; the "programme" is that of M. Leygues, but so amended as to be quite unrecognisable. It orders the laying down of 3 cruisers, 6 destroyers, 12 torpedo boats, and 12 submarines. Such is the sum total of French naval exertion since 1914! The cruisers are to be of 9,000 tons, 34 knots speed, and will be armed with eight 15-cm. guns; the destroyers are 2,500-ton ships, having a speed of 35·5 knots; the torpedo boats will be 1,400-ton ships of 32·5 knots; whilst the submarines are to have an immersed displacement of 1,100 tons. The laying down of the units is distributed over the current year. This is truly a meagre programme. Yet France was represented as an "imperialistic" nation at the Washington Conference: this forms the subject of the following section.

France at the Washington Conference.

The Washington Conference was influenced, and to a certain extent has been warped, by an incident of little moment in reality,

but one which assumed undue proportions. We refer to the question raised by Lord Lee, First Lord of the Admiralty, in regard to the use of submarines against merchant vessels. This is referred to in France as the "Castex incident." We may be allowed to enlarge upon the point; the following will show how easy it would have been to dispel the misunderstanding.

Captain Castex is one of the most distinguished officers of the French Navy; he is also a highly esteemed writer on naval subjects. Whilst he was on duty at the Ministry of Marine and professor of naval tactics at the Naval and War Staff Colleges, he published in the official *Revue Maritime*, in 1920, an article, remarkable in various respects, on "The Synthesis of Submarine Warfare." In this, Captain Castex approves, apart from a few reservations, the manner in which the German Admiralty conducted submarine warfare. This thesis, sustained in a sense officially by a staff officer, who was also professor at the said colleges, gave offence to Lord Lee, then present at Washington, and he asked for a debate on the subject, calling attention mainly to the following extract from Captain Castex's *étude*: "After a few centuries, thanks to the ingenuity of man, the instrument, the system, has at last been evolved, the martingale-boom as it were, which is capable of overthrowing finally British Naval power." Lord Lee concluded therefrom, that, according to French opinion, the use of submarines against merchant vessels was recommended, specially with a view to overthrow British naval supremacy. Now this sentence should not have been considered separately from the lines preceding it. Taken as a whole the passage applies to the German plan of 1917, and the French writer uses the present tense only to emphasise—his thoughts going back to 1917—the thesis of Tirpitz.

> *Thus do the Germans reason.* A new category of cruising war, easy to carry out, having nothing in common with the old method, now appears to be easy of achievement. Old theories fall through entirely, owing to new warfare devices. Principles even have no longer any invariability in them and are shaken. Means which formerly were doomed to failure become as child's play owing to the submarine. After a few centuries, thanks to the ingenuity of man, the instrument, the system, has at last been evolved, the martingale-boom as it were, which is capable of overthrowing finally British naval power.

It will be seen from this that Lord Lee wrongly construed the paragraph in question. He thereby attributed to Captain Castex, and by implication to France as a whole, a method of reasoning which the author, referring back to 1917, in reality stated as coming from the Germans. *Thus do the Germans reason*, he said.

The French delegation at Washington and the whole of the French Press, glad that Lord Lee had been thus mistaken, hastened to point out the error, leaving in the shade, by ignorance, it should be added, and because no one referred to the *étude* by Captain Castex, other passages in which this superior officer clearly acclaimed the German method of submarine warfare, even against the merchant service.

Captain Castex and "Piracy."

The present writer was alone in stating in the French Press what he considered to be a point of duty, namely, that whereas Lord Lee had been mistaken in regard to a certain extract, he might easily have found other passages in which Captain Castex approved of the German submarine warfare against merchant vessels. The following are among these passages:—

> Submarine warfare has frequently been called "piracy," and "pirates" those who participated in it. These expressions translated in a weak manner, a little too openly, the feelings which at the time were entertained by the generality of Germany's enemies, the surprise created by this unusual method of warfare, the unreadiness in facing it, powerlessness in regard to it, and anxiety as to its final results. Astonished, taken by surprise, momentarily impotent, anxious, they found nothing better to do than to show their vexation by stamping their feet and calling down abuse upon the evil opponent, who despised the rules of fair play and struck in secret. . . . Before thus attacking the Germans in words we should have remembered that this cruising war, using torpedo firing, was, like many other novelties of our planet, the application of a conception most essentially of French origin. . . . Further consideration . . . leads to the admission that the Germans had an absolute right to follow it (this kind of warfare) . . . Germany had the right, for her cause, to put in action all her means, and to require of her submarine armament the doing of the utmost possible harm to her enemy. . . . This constituted, as it were, a fencing thrust aimed at the lower part of the body, but a perfectly regular one. The omission of a warning previous to a torpedo action, which has given rise to so many protestations, is not so inadmissible as at first appeared. To this contention the Germans have replied, not without some semblance of right on their part, that they had "once and for all" warned all ships not to proceed through the dangerous zone . . .

From the above it will be seen that Captain Castex is personally of opinion, apart from a few reservations of little import, that the Germans acted correctly in carrying out submarine warfare by their methods, and Lord Lee might have expostulated with him without selecting an extract which rebounded against himself.

Two remarks should, however, be given prominence at this point. Firstly, Captain Castex confined his statements to generalities and principles, and when writing his *étude* he never had in view at any moment a war between France and England; Lord Lee was, therefore, quite in the wrong when he read in this the seeking of a means "finally to overthrow the British naval power." In the second place, the thesis maintained by Captain Castex never involved anyone but himself, and notwithstanding his official capacities, notwithstanding also the official character of the *Revue Maritime*, this officer was not entrusted with formulating the doctrine of the General Staff. It so happened, moreover, that when Captain Castex wrote his *étude* he was director of the said review; among his duties was the censorship of articles, he did not censor his own, and no one at the Ministry of Marine read it before it appeared in print.

France's Attitude to Submarines.

The really slight importance of the incident can now be gauged. Great astonishment was created in the French Navy that Lord Lee, with such slight cause, should at Washington have incited every nation against France. There are at least two sayings which sum up

the affair: "The game was not worth the candle," and "Much ado about nothing." By hundreds of voices, emulous the one of the other, and on such a slender basis, it was nevertheless proclaimed that France as a whole desired the annihilation of Britain by the total destruction of her merchant fleets by means of submarines, and the incident, there can be no doubt, did a great deal of harm to the moral standing of France at Washington. It is only just to add here that the French Government had the power officially to disclaim Captain Castex, but neglected to do so; the reason for this is that the French Government, like the British Admiralty, did not refer back to the whole text, but remained satisfied with combating Lord Lee's misconception.

Nevertheless, the French doctrine—and we may very well divulge this secret of the General Staff—is by no means the Castex doctrine, but is on all points in agreement with the American doctrine, as embodied in the report of the Advisory Committee read by Mr. Hughes at the Washington Conference on December 22, 1921. It proscribes "submarine warfare without restrictions"; it simply establishes in principle that the use of submarines against merchant vessels is legitimate, provided that the submarines in this respect submit to the same regulations as apply to surface ships. To our mind this doctrine is one of pure and simple good sense. Provided submarines follow international laws, as do surface ships, why should their action be specially limited?

It is true that the Root resolutions voted at Washington are contrary to the Advisory Committee's conclusions, and tend to prevent the use of submarines "for the destruction of commerce." It is doubtful whether the French Parliament will ratify this clause; whilst reproving the Castex doctrine, the French naval authorities and public opinion claim for the submarines the rules and obligations required by the laws of nations applicable to surface ships; nothing more.

Capital Ships and the French Navy.

In regard to capital ships, France, as a whole, may be said to have been surprised on learning the first claims formulated by the French Delegation at Washington. In addition to the fact that the general public since the great war has no longer any great confidence in battleships, the financial situation does not allow of any of these being laid down. The first claims of the Delegation, therefore, constituted a grave mistake, one which led France to be accused of Imperialism, and this is quite contrary to the real sentiments of the nation; after such a heavy struggle the country demands peace and tranquillity.

At the commencement of 1921, the present writer consulted a number of officers of the French Navy regarding the lessons of the war. He asked questions in the *Moniteur de la Flotte* as follows: "The greatest war which has ever soaked humanity in blood ended over two years ago, and every one of us has had time to reflect upon the lessons of the conflict and its modality. It would be interesting

to read the opinion of naval officers of every grade who took part in the actions on sea, to learn from them under what aspect future naval war should be considered. We should be grateful to those among them who would give a summary of their opinions upon the following paramount questions: 'What should be the French Naval policy? By what means and by what arms is that policy to be carried out?'"

Forty-eight naval officers sent in their replies: a vice-admiral, 5 captains, 8 commanders, 7 lieutenant-commanders, 16 lieutenants, an engineer of naval artillery, and others. Among the 48 officers are the most able thinkers and writers of the French Navy. Their replies may therefore be taken as reflecting accurately the opinion of the Officers' Corps as a whole, in regard to the naval problem as it concerns France. A certain diversity of ideas, impressions, and opinions might, at first, have been expected; the contrary was the case, and this fact renders the conclusions of the inquiry particularly interesting. The replies may here be briefly summarised.

Lessons of the War.

Most of the officers remarked that the play of alliances is never sufficiently certain for the French Naval policy to have no other basis apart from them. At the commencement of the war, Britain was on her reserve; Italy was Germany's ally; Russia was the ally of France; the United States were neutral. Notwithstanding this situation, Britain, Italy, and the United States, fought against Germany, and Russia dropped out . . . France, therefore, the officers stated, must have a Naval policy which is above the play of alliances, although, of course, taking these into account. Exertions on behalf of the Navy are in France more essential than ever, since the country, saturated as it is with military glory, does not give a thought to the sea. Incessant action upon the Government is a necessity, because, as a general rule, it is carried away by other preoccupations; it is a necessity also in regard to public assemblies, since these are generally formed of noisy marplots, and in regard, further, to the general public, for this is usually indifferent and inconsiderate.

In the matter of the Naval power deemed necessary for France, the officers' opinion was this:—"*It is not certain that battleships will in future ensure predominance on sea.* Before the war we might believe in their superiority; doubt as to this has arisen during the war. In any case, *France cannot at the present time build battleships* owing to lack of funds (it should be borne in mind that this was written before the Washington Conference); but it can be a great Naval power by *following a French plan of action.* The condemning of battleships is not the point, but to keep an open mind in regard to line-of-battle ships, so long as they remain so fragile. On the other hand a submarine costs relatively very little. *As many as* 150 *or* 200 *submarines can be built for the price of* 3 *battleships.* Therefore, is it not immediately apparent to anyone that by owning 200 submarines France would be a great maritime power, whilst by owning 3 battleships she would be nothing of the sort? (At that

time the battleships considered were of 45,000 to 50,000 tons, and their cost was estimated at between 500,000,000 and 600,000,000 francs.) If France owned 200 submarines her navy would be one to be reckoned with. Moreover, *it is incumbent upon France to acquire aerial superiority;* in this connection (in the matter of aerial superiority) a whole scheme embracing War and Marine is required."

As will be seen therefore the inquiry, in which officers of every age took part, resulted, briefly, in this opinion: The question of battleships should remain in suspense until these units are less fragile, and for the present France must concentrate her efforts upon submarine and aerial fleets.

Since the inquiry it may be added that the desiderata have become, as it were, more stabilised, and officers have on various occasions claimed for France the formation of a first submarine squadron, consisting of submarine-monitors or gunboats and submarine cruisers of 3,000 tons.

These are, therefore, the views entertained by a large body of officers who look to the future, including some of the highest rank. But are they the views of the General Headquarters Staff and of the Superior Navy Council, who have charge of drawing up a programme? How does the programme stand? This is dealt with further on.

Views of the General Headquarters Staff.

The High General Staff has a tendency to link the future with the past. A law, dated March 30, 1912, laid down a scheme for the constitution of the fleet. The attitude taken up by the High General Staff gives one the impression that they mean to abide by that and stop there, that law still serving as a basis for the financial provisions. It was the terms of that same law which the French Delegation put forward at Washington for discussing the question of tonnage attributable to France. By comparison of the wording of the project voted by both Chambers, it will be seen that it is in execution of still the same law of 1912, that during the present year 3 cruisers, 6 destroyers, 12 torpedo boats, and 12 submarines, are being laid down! This reads like fiction—the verdict of a whole century separates 1912 from 1922!

What was the import of the law of 1912? It established the composition of the French Fleet as follows: 28 first-class battleships, 10 squadron scouting ships, 52 high seas torpedo boats, 10 ships for divisions at a distance, and 94 submarines. Now, 28 battleships of 35,000 tons each make 980,000 tons, and Washington allows France only 170,000 tons. In order to work the law of 1912, the unit tonnage of the French battleships should not exceed 6,000 tons! On the other hand, the clause of the law of 1912, dealing with the construction of 94 submarines remains a dead letter. In the circumstances, therefore, it is astonishing that the law of 1912 has not been abrogated a long time since and replaced by a new programme answering the needs of the future instead of those of the past. This, we may add, has formed the occupation during the last few months of the General Headquarters Staff and the Superior Naval Council.

A programme is therefore being prepared; it is even said to be ready, although its provisions are not so far known with any degree of certainty, since, for the first time, the secret has been kept. Hitherto, and especially during the years immediately preceding the war, the Ministry of Marine was a house built of glass; the types of ships being decided upon and their characteristic features were discussed publicly, and, since Parliament acted slowly, the warship specifications were known two years before the ships were laid down. This was culpable imprudence and inconsiderateness! The French Navy itself placed means for its chastisement in foreign hands! The lesson seems to have borne fruit; the programme formulated recently is known to a few admirals only. One is simply aware that this programme is for a project distributed over a number of years—twenty years, it is stated—and takes into account both the Washington Agreements and the needs of the country. But—and it is a large "but"—the said programme can be put before Parliament only after the assent of the Minister of Finance is obtained, and the Minister of Finance keeps the strings of the State purse absolutely tight; months may elapse before the matter is laid before the Cabinet, if the various Departments concerned are not urged to act rapidly.

The Washington Agreements.

Both Chambers will, of course, have first to ratify the Washington Agreements. The Navy knows perfectly well that the vote of the programme is going to be delayed, and has in consequence decided to propose to the Chambers the passing of a *loi des cadres*, a law establishing the new complements of personnel. This means "putting the cart before the horse," for, in all reason, the personnel should depend upon the programme in view!

We have stated that the programme remains a secret. We do not believe that we are committing an indiscretion by stating that the General Staff has not given up line-of-battle ships, any more than Britain has done so. The programme, therefore, according to every likelihood, will embody the laying down of battleships in accordance with the Washington Agreements; the dates for this are distant, namely, 1927, 1929, 1931. Between now and then activities can bear upon light units and submarines. From certain indications, it is gathered that the total tonnage of the current schemes is 600,000 tons, distributed over battleships (170,000 tons), cruisers, destroyers, and submarines. This is all that can be said in the matter.

As for the arsenals, after numerous difficulties, due to parliamentary influences and electoral interests, the Navy has only recently adopted a plan for the making of economies. The plan consists in converting into supporting bases the military ports of Cherbourg and Bizerta, in maintaining at Lorient the naval colleges and yards only, and in doing away with the Rochefort arsenal and of the Guérigny works. The saving expected from these measures will not exceed 40,000,000 to 50,000,000 francs annually.

Opinions of Naval Architects.

The Corps of Naval Constructors, whose duty it is to draw up ships' plans according to indications supplied by the Grand Councils appears, like the latter, to entertain the belief that the last word has not been said on the battleship, and the naval constructors have at the present time under consideration the designing of a first line battleship able to withstand the attacks of submarine torpedoes and aerial bombs. In the present state of scientific knowledge, this result can only be achieved by more complete sub-division of the vital parts of the ship and by the horizontal protection of the armoured deck. The French are of the same opinion on this subject as the naval constructors of all other nations. They believe, moreover, that the 35,000-ton limit decided upon at Washington for battleships does not allow of a satisfactory solution of the protection problem. Owing to this limit, either the battleship will not have the requisite offensive power and speed, or else if it is suitably armed and suitably fast, it will remain vulnerable to the submarine torpedoes and aerial bombs. It is estimated that the tonnage should have been 45,000 or 50,000 tons to allow the battleship to regain its superiority over the new weapons.

In the matter of submarines, which, as stated, have by far the preference, the Corps of Naval Constructors appears to be rather in an indefinite position. It should be stated here that from the commencement they have wandered more or less. In not utilising these boats—limiting themselves to their theoretical conception—they have asked too much of this class of craft. Whilst the Germans gave to their submarines a considerable endurance, sacrificing speed if need be, the French have made for speed, to enable the submarines to accompany the squadrons, sacrificing radius of action and endurance. This has led France to the fitting of machinery of extra high power in small hulls, and has resulted in many disappointments.

It would appear that the same error is being repeated in the case of the new 1,100-ton submarines of the last programme, which are to be equipped with 1,500-H.P. engines. The sailors and ships' engineers asked for this power on a tonnage of 1,400 tons, since this would have enabled the provision of heavier and stronger engines. The naval constructors disagreed, and both the sailors and ships' engineers, whose duty it is to navigate the ships when built, did not enforce their wish. As a rule the naval constructors are too prone to seek after perfection, and do not view a problem sufficiently from the practical standpoint. We may state this, for it is the unanimous feeling on the part of the officers commanding submarines, and is no secret generally. When an evil is known, it is always easy to apply a remedy; the will to this is all that is necessary.

The Attitude of the Personnel.

Never since the Navy of Louis XVI. has France had for her Fleet such a number of distinguished officers as at the present time. The officers were most capable scientifically previous to 1914. They have

specialised in the different branches in admirable naval colleges. Most of the officers, moreover, have had to carry out their share in the war under most exacting conditions, such as fighting against submarines, supervising convoys, sweeping for mines, and so forth. Hence they have acquired great experience in navigation, and from the military standpoint, in the commanding of men. The petty officers have also a most excellent standing, having acquired great experience and being imbued with unbounded zeal; unfortunately, owing to budget requirements, the petty officers are compelled to retire after 25 years of service, at the age of 42 or 44, at a time therefore when their efficiency is at a maximum. Taken as a whole, the naval personnel leaves nothing whatever to be desired, and in spite of slow promotion, due to restrictions in the complements, the morale is very high. But nevertheless, and from the rank of Vice-Admiral down to the sailor, the whole Navy calls for a renovating programme and one showing real life.

The great majority of the French nation places above every other consideration that which concerns the continental destiny of the country, whilst the naval personnel, on the other hand, are dazzled by the patent evidence that on the world chessboard the large naval Powers—Britain, United States, Japan—are those which are able to act most effectively. Since she lacks the Navy she needs, France has no "elbow room" notwithstanding the important part she played from 1914 to 1918, and France feels it. She feels still more that her aspirations are distorted, even derided, by friendly nations. It is most astonishingly irrational to state that France entertains exorbitant naval pretensions, seeing that she has been so entirely taken up by continental affairs since 1914 that she has not been able to build one single ship of any importance. The new programme itself is still "in the clouds," yet one speaks of the imperialism of France!

To some extent there may be imperialism in words, since the French are a Latin race and loquacious; it is not imperialism of the mind, and what "imperialism" there may be is found in the French Navy to a lesser degree than anywhere else. But the French Navy wants to live, wants to be an honour to the country. Is not the feeling quite a natural one?

A. Delpierre.

CHAPTER VII.

Cruisers and Naval Warfare.

Many articles have been written on events at sea during the war, and there is no need to touch on the strategy or principal actions of the naval campaign, but to restrict attention to the general work carried out by cruisers.

Let us first briefly consider the cruiser position at the commencement of the war. Our Navy included 38 armoured and 72 light cruisers,* 30 of the latter being old and obsolete. Of the total number, 4 armoured and 4 light cruisers were with the Mediterranean fleet, 19 armoured and 27 light cruisers abroad and on the trade routes; the remaining 15 armoured and 41 light cruisers were in the North Sea and home waters. Such was the situation when hostilities commenced. Subsequently, all cruisers of fighting value were recalled from foreign stations to the North Sea, and the protection of ocean commerce was entrusted principally to older cruisers, of which we will speak later.

The principal functions of cruisers may be placed under three separate and distinct headings: (1) Scouting; (2) Protection of Commerce; (3) Blockade.

Scouting.

Battle-cruisers, with high speed, moderate armour, and heavy armament, were the main support of all scouting cruisers; they had especially to deal with the hostile battle-cruisers, therefore, so long as the enemy's battle-cruisers remained in the vicinity of the North Sea, they were essential to the Grand Fleet. Had the enemy's battle-cruisers succeeded in breaking out into the Atlantic ours would undoubtedly have followed them; but so long as our battle-cruisers held those of the enemy in check our other cruisers were enabled to maintain the blockade and escort, from all parts of the world, troops, munitions, and food necessary for the prosecution of the war.

Assuming the battle-cruiser to be the fundamental basis of cruiser work, let us consider the functions of other cruisers. Those with the fleet formed a screen of look-outs and scouts, their special duty being to locate and report to the Commander-in-Chief the position, course, and speed of the enemy's battle fleet. In battle formation they were stationed in the van to protect the battleships against mine-layers and destroyer attack, and when the fleet was

* Seventeen light cruisers were under construction.

in harbour they were out on patrol, sweeping the North Sea, hunting for raiders, and performing various other duties, but when the fleet put to sea the cruisers rejoined and took up their scouting positions. During 1915, Grand Fleet armoured cruisers carried gold across the Atlantic, about five million sterling in each ship; and during the transport of munitions to North Russia they patrolled the route to Archangel. The weather experienced in winter off the Murman coast was terrible, continuous gales and snow; all shore lights were invisible owing to glasses of lamps being coated with frozen snow. Under these circumstances, with scarcely any daylight and observations unobtainable, navigation was extremely difficult. Decks and upper works were frequently covered with snow and, the ships being in no way fitted for Arctic weather, men suffered severely from the cold. Patrolling in the North Sea was light work compared with this.

Space will not permit amplification of the functions of cruisers in the North Sea or Arctic waters, it is sufficient to say they kept the same ceaseless vigil day by day, year in and year out throughout the war. It is on record that within three months one cruiser steamed 15,000 miles. The men of these cruisers had to put up with the many hardships inseparable from winter in the North Sea or Arctic waters, the ships continually running with water and damp throughout, the cold intense with the wind and sea such as is experienced only in those God-forsaken waters; the crew crowded together between decks to sleep as best they could, the living spaces insufficiently heated and look-out positions and night defence quarters on deck with little or no shelter from the glacial blast or the lashing of the blinding spray; when in harbour little rest, merely coal heavers coaling ship and then out to sea again; such was life in these cruisers, yet the spirit of the men was magnificent. There is a limit to human endurance, therefore is it to be wondered at that the perpetual strain left its mark in many cases? Broken health and ruined constitutions tell their tale, and although men wear no wound stripes, they may have suffered and endured and may share equal honour with those who were wounded or maimed in action. We are apt to give insufficient consideration to the human element. Material may be the best, machinery the most perfect that science can produce, yet without the human element they are useless. If we are to expect the best results, in constructing our cruisers we must consider the human element equally with the material. It is now some generations since Sawarroff said: "The weapon itself is nothing, the man behind it is everything." This is true for all time.

Protection of Commerce.

The principal systems for protecting commerce by various types of cruisers may be said to be, patrolling trade routes, guarding the converging points of trade routes, and convoying. To have patrolled all trade routes would have required more cruisers than were available, and until the convoy system came into being, the guarding of converging points was resorted to. For this purpose the oceans were

divided into areas. Let us take for example the most important areas in the Atlantic.

The West Atlantic area, from the meridian 40° W. to the American coast, through which pass all the great western routes, was guarded by only five * cruisers under Rear Admiral Sir Christopher Cradock, who was faced with the problem of protecting our commerce in that extensive area, of watching enemy's merchant vessels sheltering in neutral ports and of hunting down enemy's cruisers known to be in those waters. This indeed was a superhuman task.

That illusive sea wolf, the Karlsrühe, successfully avoided Cradock's ships and inflicted serious damage to our commerce in that area, but the ocean is wide, and it was practically impossible for his cruisers to round up this fast modern light cruiser. Cradock, with the cruisers Good Hope, Monmouth, and Glasgow, was subsequently ordered to search for the German cruiser squadron in the Pacific, where he met disaster off Coronel. There will always be criticism after disaster; he could have been sent for no other purpose than to fight, and having come into contact with the enemy he had no option; and, further, he could not then have refused battle had he wished to do so, because the enemy's speed exceeded his own. Hence the tragedy. Let us be under no misapprehension in the matter: the cruiser force in that part of the world was totally inadequate.

The mid-Atlantic, an equally important area, between West Africa and Brazil, through which passes all commerce from the southward, was guarded by only four † old cruisers, two of which were almost immediately despatched to other stations.

The south-east coast of American waters had the protection of one light cruiser ‡; an impossible task. The North Atlantic, northern portion, had six § obsolete cruisers. The Northern patrol, guarding exits from the North Sea to the Atlantic, consisted of six of the most obsolete cruisers of the "Edgar" class built in 1890, about which all that can be said is they managed to keep the sea for a time. Other outlying stations were similarly short of suitable cruisers, but in the Far East and the Mediterranean, Allied cruisers co-operated. Armed merchant cruisers reinforced the outlying squadrons. These vessels, singly, were no match for enemy's cruisers, but when within support of our cruisers were a valuable asset.

One of the outstanding incidents of the war was the duel between two armed merchant cruisers, Carmania ‖ and Cap Trafalgar, in the South Atlantic, when the best matched and most desperate action took place. In a private letter, the late Captain Grant of the Carmania described how these two great liners, standing high up out of the water, huge targets, closed to within almost point blank range pumping high explosive shells into each other. The Carmania hit 79 times, on fire, burning fiercely and in danger of blowing up, whilst her opponent in her last death gasp rolled over and sank—

* Suffolk, Essex, Berwick, Lancaster (County class), and Bristol, light cruiser.
† Carnarvon and 3 "Monmouth" class. ‡ Glasgow.
§ Four "Europa" class; 2 "Vindictive." ‖ Cunard liner.

—a fight to the death—and this with a crew of the mercantile marine, surely a most unique and thrilling feat of arms. The public is not sufficiently acquainted with the details of this gallant action. The whole story should have been written and published. We may be sure that Captain Marryat would have written an account that would have sent a thrill from end to end of the Empire.

Blockade.

The Northern blockading squadron, composed entirely of armed merchant cruisers, kept the sea throughout the war, patrolling all exits from the North Sea to the Atlantic by the northern passage. Frequently attacked by submarines, some of them torpedoed, yet in all seasons of the year they kept their endless watch from the ice-fields beyond Iceland to the Scottish coast, maintaining the blockade of the North Sea until slowly, but surely, the enemy was strangled. These ships were commanded by Captains, R.N., but the crews were of the Mercantile Marine. There is no finer example of dogged perseverance and seamanlike ability than that shown by the men of this squadron.

The Convoy System.

A thrilling volume could be written on the convoy system which was adopted at a period when enemy's submarines were inflicting so much damage to merchantmen that the position of the Allies was critical. It amounted to this : if the necessary troops, munitions, and supplies could not be conveyed to their destination the prosecution of the war would be impossible. The convoy system was inaugurated early in 1917.

Ocean convoys consisted of 20 to 30 vessels sailing in company as a fleet, escorted by a cruiser or merchant cruiser as far as the submarine area near the United Kingdom, whence a destroyer escort accompanied them, the duty of the cruiser being to protect them against surface raiders. When near their destination, the ships of the convoy dispersed and proceeded independently to their respective ports. Such, briefly, was the procedure during the early days of convoys. Subsequently aircraft and submarines also took part in the protection of convoys whilst in the submarine area.

In 1917, a certain convoy took 19½ days on passage from Hampton Roads, Virginia, to Liverpool, averaging 7½ knots, and experienced continual gales, rain, and heavy seas. The convoy consisted of vessels of all sizes and descriptions. Imagine this armada at night time, showing no lights, in thick weather and with a tremendous following sea. The night before its arrival at the rendezvous was as dark as pitch, and the gale was at its highest. No signals could be passed, some of the ships hove to, others hauled out of line to avoid ramming their next ahead, and some could not keep steerage way. Is it any wonder that in the morning the convoy was scattered and several ships were out of sight? The

destroyers were met at daylight and several stragglers rejoined, but seven were missing with whom no communication was obtainable. Having waited so long as was prudent, the remainder of the convoy proceeded. Convoys were running to time table and the destroyers were required for the next convoy. Courses through the submarine area were directed by the Admiralty and zigzagging was maintained. The danger of thus approaching the land in thick weather will be realised. The cruiser suddenly sighted breakers ahead, promptly turned 16 points signalling to the convoy as best she could, and, although it occurred in thick weather, all ships escaped from running on the rocks. The convoy proceeded through foul weather, dodging mines and being attacked by submarines * until arrival at its destination.

Only those who have cruised unprotected amongst mines and submarines can appreciate one's feelings when joined by an escort of those fearless little watchdogs, the T.B.D.'s. Insufficient has been said of the splendid work accomplished by the Mercantile Marine. One's heart went out especially to those little tramps that had insufficient speed to accompany a convoy and had to face the perils of the voyage alone and unprotected, some of the crew of which had been torpedoed on more than one occasion but readily returned to duty and sailed again.

The enemy little knew the spirit of the men he had to deal with when he commenced his nefarious practice against our merchantmen. To the men who manned them, the finest seamen on God's earth, we owe an eternal debt of gratitude; the war could not have been won without them. Whenever we see the red ensign, let us always recall what those gallant merchant seamen did to uphold the Empire.

Further, when we consider the numerous military operations in all parts of the world that demanded the services of cruisers in addition to the protection of commerce, the magnitude of their task will be realised. The Grand Fleet required the latest and best cruisers for the North Sea, and the supremely important duty of commerce protection was entrusted principally to old and unsuitable cruisers, several of which belonged to the third † fleet and for months had been lying in dockyards, some waiting for the scrap heap. Fortunately the enemy possessed little enterprise. The theory that the Grand Fleet could prevent all enemy's raiders from reaching the Atlantic was a fallacy, for during the long dark winter nights, or in thick weather, no blockade could have prevented some raiders from breaking out of the North Sea; and when we consider the few occasions upon which they appeared singly on trade routes, the great damage inflicted by them, and the inability of our cruisers to round them up, we must conclude that had numbers of them ‡ emerged, especially during the unrestricted submarine warfare, the consequences to us might have proved fatal. It is impossible to catch fast raiders

* One merchant ship of the convoy was sunk by torpedo.

† Reserve in dockyards.

‡ Not necessarily cruiser raiders only, but fast merchant vessels fitted out as raiders, such as the Moëwe.

unless pursuing vessels have speed and endurance—qualities which our ocean cruisers lacked.

Our Present Fleet of Cruisers.

Let us admit that the weak spot in our armour was the want of commerce protectors; but what of the present situation? All our armoured cruisers have been scrapped. They were the mainstay of our commerce protection, and what have we at present to take their place? There remain, for all purposes, 60 light cruisers, of which some half a dozen only can be considered as ocean commerce protectors, the others being of light tonnage and small endurance.

Our squadrons at present on foreign stations, excepting the Mediterranean, consist mostly of light cruisers, of which the Hawkins * and Raleigh † are the only two designed as commerce protectors.

Taking the late war as a precedent we may assume that most of the other light cruisers would be required for the fleet. How, then, are we to protect our commerce? We may take it for granted that the convoy system has come to stay; its prodigious success during the war is universally acknowledged. How are the convoys to be escorted? There have recently appeared in the Press articles decrying the merits of the surface ship, the submarine enthusiast extravagantly lauding the possibilities of the submarine, the air enthusiast similarly lauding aircraft, each partisan claiming that his fancied instrument of war renders surface craft useless; one critic pictures commerce entirely transported by air or under water; another speaks of huge air ships spreading vast clouds of poisonous gas over wide areas of ocean. But these are dreams of the future that do not come within the scope of this chapter which deals with contemporary matters; let us look at them in a reasonable and unbiased way.

The Submarine as a Commerce Destroyer.

In considering the submarine as a commerce destroyer, one has first to determine the degree of ruthlessness which is deemed politic. A submarine of heavy tonnage, with surface speed of 20 knots and large endurance, capable of keeping the sea on its own resources for an extended period,‡ if indulging in ruthless warfare and attacking everything sighted, is undoubtedly to be reckoned with; but it is to a great extent subservient to atmospheric conditions, the state of the sea and navigational difficulties, added to which its heavy tonnage

* In China.

† In North America. Raleigh was lost August, 1922, off the Labrador coast.

‡ A submarine can be constructed to keep the sea for six months on her own resources, with 18 to 20 knots surface speed, and 9 to 10 knots submerged, and capable of diving to 500 feet, but its delicacy is much affected in many ways: depth of water; currents; temperature of air and sea; state of weather; day or night; latitude; season (length of night necessary for charging); high temperature affects health of crew, and causes battery troubles; depth over safety introduces a limiting factor.

renders it vulnerable to attack, and the life of its crew during winter in the Atlantic would be *hell.* The submarine is a fine-weather craft, and at present is little to be feared in mid-ocean. During the war less than 1 per cent. of vessels in convoy were sunk by enemy's action, though they staked all on submarine attack at the converging points of trade routes, and there is no reason to assume that they would meet with any greater success in mid-ocean. We cannot assert what the future has in store for the submarine. Time, experience, and experiment alone can decide. Should it develop beyond anticipation, possibly an antidote may be found in aircraft, another submarine, or surface craft, perhaps a combination of all three, but the time has not yet come.* The submarine, at present, is certainly not capable of replacing the surface cruiser for continuous ocean escort in all weather; nor yet is the aircraft, which is even more susceptible to the elements, and there does not appear to be any likelihood of such an event taking place in the near future. Therefore, in the absence of a more effective instrument of war, the surface commerce protector must be maintained, ocean convoys must be escorted by them, and the converging points of routes near the United Kingdom must be protected by other craft.

The Need for More Cruisers.

We cannot afford to risk the safety of our commerce on experiments. Reduce the number of your battleships, cut down the number of submarines or aircraft if you must, but no naval holiday at present for cruiser construction. The fewer the battleships the greater the necessity for commerce protectors. Agreements, treaties or conferences, if they assist in checking aggressive policy, are undoubtedly of value, but they are not absolutely binding nor are they infallible to inexorable realities, and we may unexpectedly be faced again with war. Let us not be found unprepared to defend our most vital spot.

The question then arises whether the functions of a fleet cruiser and commerce protector could be performed by the same type of vessel. Experiences of the war teach us that an ocean commerce protector should be of at least 9000 tons, an economical steamer with large endurance at cruising speed and capable of rapidly raising steam from economical to full speed; whereas a fleet cruiser could be of less tonnage, but should be a handy craft of great speed and good endurance at high speeds. A point in favour of one type for both functions is the facility with which ammunition, stores, spare parts, etc., could be supplied on interchange of stations; but this consideration is outweighed by the advantages of a heavier tonnage for ocean work. Everything points to a special type for commerce

* The submarine menace to our commerce was overcome, but we were unable to cope with three or four single ocean surface raiders, Karlsrühe, Moëwe, Wolfe, etc., all of which carried out extensive cruises without interruption and inflicted serious damage. What if the enemy had exercised more enterprise and turned out many of these raiders?

protection. This being so, let us compare types of some of our cruisers. The particulars are given in the accompanying Table I.

TABLE I.—PARTICULARS OF EXISTING TYPES OF CRUISERS.

Class.	Tons.	Speed in knots.	Fuel.	Endurance. Maximum continuous speed.	Armament.	Remarks.
"E" class (2) Enterprise	7,550	33	oil	not known	7—6-*in.*	Not completed.
"D" class (8) Danae	4,650	29	oil	1,400 / 28 knots	6—6-*in.*	
Improved "Birmingham" Hawkins (4)	9,750	30	coal 800 / oil 1420	1,900 / 28	7—7·5-*in.*	Only 2 commissioned. Endurance at 2/5th 3,000 knots.
"C" class * (27)	4,190–3,750	29	oil	1200–850 / 27–28	5—6-*in.*	
"Town" class (12) Birmingham Weymouth	5,400–5,250	25–25½	coal	2,400–2,790 / 23	8 or 9—6-*in.*	

EXISTING TYPES OF CRUISERS.

The "Hawkins," "Enterprise," and perhaps "Birmingham," are the only classes to be considered for ocean work, the remaining light cruisers having too small an endurance and tonnage. The "Hawkins" type was designed for commerce protection, and the "Enterprise" for fleet work. Without information of actual steaming results, their respective endurances at economical speed cannot be accurately assessed, but it is greatly in excess of earlier classes of light cruisers. Judging by tonnage and horse power, the "Enterprise's" endurance should be less than that of the "Hawkins'"; but herein lies the great difference, the tonnage and armament of the latter are the more suitable for ocean work, and the great speed, armament, and tonnage of the former are more suitable for fleet work. We must, therefore, conclude that the "Hawkins" is the best type we have as ocean commerce protector.

Now as to the fleet cruiser; the "Enterprise" has light armament for her tonnage, and is heavy for light cruiser work, but possesses great speed and apparently good endurance; the "Danae" has speed and gun power on comparatively low displacement, but possesses small endurance, and is too light; the "Birmingham" has insufficient speed and is a coal burner. All other types are of small tonnage and endurance, obviously designed for the North Sea. The naval storm centre having shifted, we find ourselves in this position: most of our light cruisers have insufficient endurance, and are too light for ocean work.

In these circumstances it is of interest to consider the endurance of the "Hawkins" and "Enterprise" classes, as far as it is possible

* Including "Anzac" cruisers.

to form estimates on the available statistics. The estimated endurances at various speeds of both classes are given in Table II.

TABLE II.—ENDURANCE OF "HAWKINS" AND "ENTERPRISE" CLASS CRUISERS.

Class.	Fuel (tons).	Endurance at various speeds.	
	Oil Coal.		Knots.
"Hawkins"	1,420 800	at 14 knots	4,800
	(Equivalent to 2000 tons of oil)	at 23–24 knots	3,000
		at 25–26 knots	2,700
		at 28 knots	1,900
	Oil		
"Enterprise" ("E" class) . .	1500	at 14 knots	3,840
	(estimated maximum; possibly less)	at 23–24 knots	2,400
		at 25–26 knots	2,160
		at 29 knots	1,520

If it were possible, a light cruiser with tonnage of "Birmingham," speed of "Enterprise," and endurance of "Hawkins," with adequate 6-in. armament, anti-submarine bulges and anti-aircraft armament, would probably be an ideal fleet cruiser. What of the ideal commerce protector? Assuming our prospective enemy capable of seriously threatening our commerce with surface craft, the ideal commerce protector would appear to be an improved "Hawkins" of about 11,000 tons with turbines, small tube boilers, oil fuel, large endurance at economical speed, and capable of rapidly raising steam from economical to high speed.

Reasons for these qualifications are, light tonnage is subject to considerable reduction of speed in a seaway; turbines are to a great extent immune from minor breakdowns, and are easily manipulated, and with reduction gear their economy has much improved. Oil fuel obtains increased power, and high power steaming can be maintained until practically all the oil is consumed; less manual labour is required, and the time taken to raise steam from medium to full speed is approximately half that taken with coal; refuelling can be more readily and expeditiously carried out, and the ship's company can obtain a much needed rest when in harbour, perhaps only for a few hours. It is true that per unit of work coal is cheaper than oil, but with the universal use of oil its cost will decrease.* The

* Calorific value of coal (Welsh) . .	14,800 B.T.U.'s per lb.
do. do. oil . . .	19,500 do. do.
Evaporative power per lb. of coal .	15 lbs. of steam from and at 212° F.
do. do. oil .	20 lbs. do. do.

STOWAGE.

Welsh coal	39 cub. ft. per ton.
Oil fuel	36 do. do.

STOWAGE FOR SAME POWER.

Coal (1 ton)	39 cub. ft.
Oil	28 do.

MANUAL LABOUR.

Up to 50 % less for oil than for coal.

advantages of oil fuel over coal for commerce protectors are clearly demonstrated, but the maintenance of special oil tankers for refuelling at sea and in harbour, and oil depôts at home and overseas will be necessary.

The General Problem of Commerce Protection.

We have outlined an ideal type of fleet cruiser and commerce protector, respectively; the necessary number to be maintained now remains to be considered. This question covers a very wide ground, influenced by political and economical considerations, and by what enemy we may have to face. Assuming our prospective enemy to be of great naval strength, we should require at least as many fleet cruisers as we had during the war. So far as commerce protection is concerned, we obviously cannot cover the ocean with cruisers, nor in our present financial state can we construct a sufficient number of special commerce protectors to escort all our convoys. We must first examine the state of the national exchequer, cut our coat according to the cloth and maintain as many as we can reasonably afford, to escort our most important convoys, and we must trust to old cruisers, old battleships, or any available craft for the protection of other convoys. Fast merchantmen could be fitted so as to be readily equipped with adequate gun and torpedo armament also to take their place on convoy duties. This admittedly would not be a perfect solution of commerce protection, but it would be a nucleus to be augmented when our finances permitted. It is the least we can do at present, compatible with our security.

It is astonishing that so supremely important a matter as the protection of commerce has received in the past so little consideration. Mr. Balfour is reported to have said at the Washington Conference, "The most difficult problem of the late war was the keeping open of sea communications between Europe and the United States," and we are bound to admit that, by denuding the ocean of suitable cruisers, this problem was worked on an incorrect basis. Oft repeated warnings as to the necessity of adequate steps being taken for protection of commerce, sounded by credible persons from time to time, have fallen unheeded. We have been obsessed with the "Dreadnought" era and have given insufficient thought to the ocean highway, our means of life.

A distinguished historian pictured the great Napoleon standing on the cliffs of Boulogne, gazing out to sea with covetous eyes towards the English coast, and far away on the horizon he caught a glimpse of the sails of those storm beaten vessels, the ever present, ever watchful English cruisers that stood between him and the domination of the world. Can we not appreciate the signification of this picture? History frequently repeats itself. Battleships are still the dominating factor in war; cruisers are still the eyes of the fleet, the police of our highways and guardians of our daily bread. We are surrounded by the sea, our greatness is of the sea, our history is wrapped up in the sea, and our future is dependent on the sea. A great war against our Empire must be a war on our sea communica-

tions. It is the bounden duty of each one of us to impress upon the nation, and upon those who have the ordering of our fleet, the paramount importance of adequate protection for our commerce, and the vital necessity for the maintenance of our sea communications—our main artery, our very life. Can we blind ourselves to these incontestable facts? We must, as a nation, face the inevitable. Let us make certain of our daily bread.

> "You, you that have the ordering of her fleet,
> If you should only compass her disgrace,
> When all men starve, the wild mob's million feet
> Will kick you from your place,
> But then too late, too late."

W. H. D'Oyley.

CHAPTER VIII.

Sea Power and Air Power.

For 1,000 years the sea has been the bulwark of these islands, and just as the advance of science has removed the bulwark itself from the design of the modern ship so is this same development gradually altering the definition that the word "island" implies. This, however, is not the same as saying that the command of the seas is no longer vital to the British Empire—for so long as the great volume of merchandise is moved upon the waters, so long must the command of the waters or seas be vital to us. Nevertheless, it does imply that the method by which that necessary command of the seas is obtained may be altered. It is proposed to investigate how that method is altering and to formulate a new doctrine to meet the changed conditions.

During the last year, the public have been treated by the Press to the consideration of many different plans—some sound and others fantastic—as to what steps the Government and the fighting departments should take to meet the new conditions.

It is suggested that before either the organisation or the actual technical appliances required can be considered, it is essential to study the fundamental facts of the situation. The British Navy has developed slowly. In the early days there was little or no difference between a trading ship and a warship, and the average vessel could be used for either purpose. Accordingly the regular Navy, or King's Ships, scarcely existed ; only a few were retained as a nucleus and in time of stress merchant ships were either hired or impressed. Sir Clements Markham, writing in Sir W. L. Clowes' "History of the British Navy," states the position as follows :—

> "The work at sea which is now done by three services, the Royal Navy, the Mercantile Marine, and the much neglected expeditions of discovery, was, in the whole early period of our history, combined."

An interesting illustration of the large proportion of merchant vessels used in a Fleet action is given by an analysis of the composition of the English Fleet that attacked and defeated the Spanish Armada :—

	No. of ships.	No. of men.
Her Majesty's ships	34	6,289
Merchant ships under Sir Francis Drake	34	2,394
Ships paid by the City of London	30	2,180
Merchant ships under the Lord High Admiral	18	751
Victuallers	15	810
Coasters under the Lord High Admiral	20	993
Coasters under Lord Henry Seymour	23	1,090
Voluntary ships	23	1,044
	197	15,551

The Demands of Commerce and War.

As science developed so the divergence between the fighting ship and the trading ship became more marked, with the result that the Royal Navy at the outbreak of the War in 1914 consisted of battleships, cruisers, destroyers, submarines, mine-sweepers and other special craft, and not one of these classes of vessels had any similarity to a merchant vessel. Nevertheless, the Royal Navy had to call upon the Mercantile Marine, not only for the transport of its own supplies and those of the Army, but also for fighting purposes. The submarine campaign called for an enormous number of vessels for purely fighting purposes and at the end of the war there were some 3,500 auxiliary vessels converted from fishing and trading purposes.

In regard to personnel, there were three men, drawn either from volunteers or the mercantile marine, enrolled in the Royal Navy to every man that the Navy employed at the outbreak of war. Without this great marine reserve to draw upon, it is more than doubtful if British Arms would have been successful either at the time of the Armada or during the Great War.

The lesson to be drawn from our experience extending over many centuries is clear and may be expressed as a necessary condition precedent to the acquisition and maintenance of sea-power, namely, sea-power must be built up upon the broad base of a great mercantile marine which in war time co-operates with a powerful and efficient Navy of specialised fighting vessels.

The Functions of the Navy.

This vital condition must be borne in mind when consideration is given to the subject of the influence on sea-power of the latest development of science, namely, air-power.

Before discussing the influence of airships or aeroplanes upon sea-power, it is necessary to elaborate the functions of a Navy and to study the development of the capital ship.

The British Navy exists to perform two main functions:—

(1) To secure the seas to all British and friendly ships.

(2) To deny the seas to all enemy ships.

It exists for no other reason. The method by which it attains its objects is either to fight or contain the enemy warships—but it does not exist for that purpose. It is very necessary clearly to distinguish between the political object and the military method by which that object is attained.

If the political object—the safe transport of our own troops and merchandise—can be obtained without the intervention of a floating Navy, there is no reason for a floating Navy at all. It is, therefore, a fallacy to argue that because we wish to transport merchandise on the water, it necessarily follows that our military method of enforcing that result must consist of vehicles also travelling on the water. The point to determine is whether or not existing air-machines contain the "*possibility of development to such degree*" that they might eventually be able to effect the above political object.

During the late war, the enemy battle fleet was not destroyed but merely contained. Whilst all enemy surface ships were contained, however, the British nation was at one time losing over 1,000,000 tons of shipping monthly due to the action of submarines and mines. A condition therefore arose, of a Power able to deny the seas to the enemy but only partially able to secure the seas for its own vessels. The capital ship for the first time was confronted with a means of attack which its protecting screen of destroyers, cruisers, etc., was only partially able to counter. It would seem that the general deduction to be made is that although during the Great War the capital ship was still supreme, its hitherto undisputed autocracy was beginning to be undermined.

Before the advent of the submarine, the capital ship, representing the embodiment of the greatest sea-power unit, could go when and where it liked unless more numerous hostile capital ships were brought against it. The submarine, however, having the power of invisibility, had not only no necessity to fly before the battleship, but the battleship herself had to seek safety in flight from the submarine. The submarine was a three-dimensional vehicle which could not rise above the water. Aircraft have now come upon the scene and they are also three-dimensional craft, but cannot go under the surface of the water. What effect will they have upon the method of acquiring and maintaining sea-power? Will they have more or less influence than the submarine? These are the questions that must be answered.

The Work of the Battleship.

A battleship is not the invention of a genius but the product of development over centuries, and exists to fulfil the following functions:—

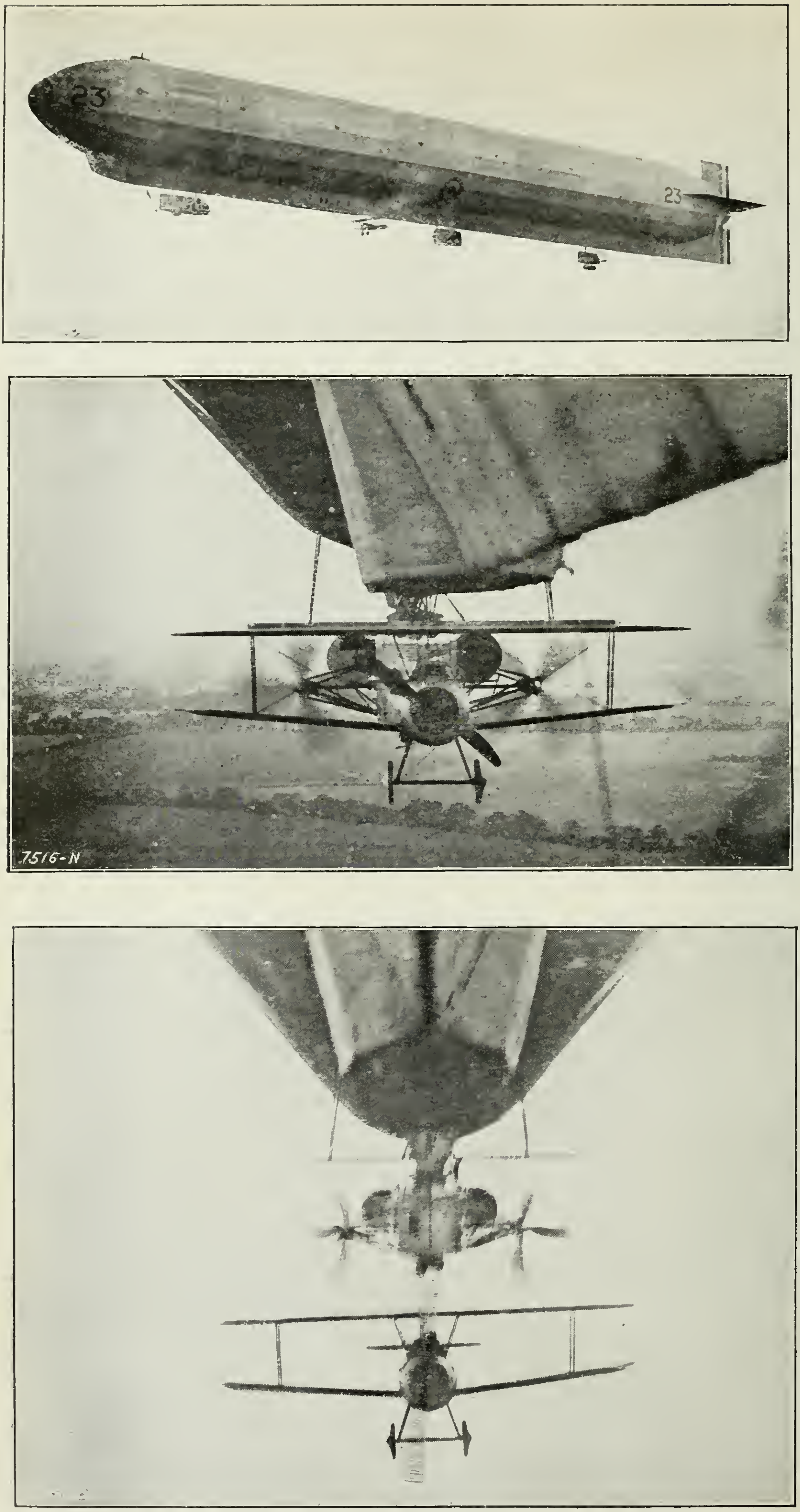
(*a*) To transport from itself to a position where maximum damage may be done to an enemy craft, a certain weight of explosive or poison gas. This transportation is performed by a mechanical appliance called a gun or a cannon.

(*b*) To transport the guns or cannons at the highest possible speed for the greatest possible time. This has necessitated a hull that will float upon the water and with steam turbines, etc., to propel it.

(*c*) To be protected as much as possible from hostile attack. This has necessitated carrying armour, watertight bulkheads, saddle tanks, etc.

The result is the battleship as we know it—but its main function is that indicated in clause (*a*), the others are auxiliary.

Aircraft have to fulfil the same conditions, but owing to their elemental characteristics they can do so, in some respects, more easily than the battleship. Firstly, gravity replaces the gun; secondly, speed through the air is more easily attained than speed through the water; and, thirdly, their high speed and three-dimensional movement render the same degree of armour unnecessary.



LAUNCHING A SCOUTING AEROPLANE FROM H.M. RIGID AIRSHIP R. 23.

A broadside of ten 12-in. guns fires 10 projectiles each of 850 lbs. weight, but owing to the firing stresses the base and sides of the shell have to be thick and strong, and the weight of explosive, such as lyddite, is only 110 lbs. That is to say the weight of the whole broadside of a battleship is only 1,100 lbs. in explosive, or the amount that one aeroplane can carry.

A Question of Radius of Action.

It would appear, therefore, that making allowances for future developments in devices for dropping bombs, etc., accurately, the aeroplane on a basis of cost might be better investment than a battleship, as 80 aeroplanes would carry the striking-power of one battleship. As regards speed the aeroplane has, of course, many times the advantage of a battleship. The aeroplane has, however, one great defect which renders the above two advantages of such limited application as to make it quite outside the range of practical politics to suggest the aeroplane of to-day taking the place of the battleship, and that defect is its limited range of action. Until this disadvantage is removed, no Admiralty in the world can consider reducing its battle fleet in favour of aircraft. The question at issue therefore resolves itself into "Can the defect be remedied, and if so how?"

The object of sea-power is to protect the great ocean trade routes and, if England is taken as a centre, a radius of action of 12,000 miles to 14,000 miles is required. The necessity for this large radius of action is one of the reasons which necessitated the Admiralty allowing for more fuel storage in the design of British battleships than did the German Admiralty.

It would seem that a combination of airships and aeroplanes might remedy this defect. If this supposition is correct, it is necessary to look upon the aeroplane as the gun of the airship, as the great size of the airship so decreases the protection inherent in the aeroplane, due to its small size, high speed and three-dimensional movement, as to render it unsuitable as an actual attacking vessel.

Experiments have proved that an airship can carry an aeroplane and release it when flying at full speed. Preliminary experiments have also demonstrated the feasibility of the aeroplane returning to the airship when the latter is in flight. If, in consequence, the airship and aeroplane are considered as a unit embodying the greatest potential air force that can be produced, it is necessary to consider the performance of such a vehicle in comparison with the battleship.

Battleship *versus* Airship.

Take as a basis an airship of 5,000,000 cubic foot capacity which experts inform us can be built to-day. A cruising speed of 80 m.p.h. should be maintained for a distance of 4,000 miles when carrying 54 tons of armament. Conversely, if a greater cruising radius is desired, 30 tons of armament could be carried for a distance

of 6,500 miles at 80 m.p.h. or 12,000 miles at 45 m.p.h. The armament might consist of the following:—

2 large seaplanes carrying 21-in. torpedoes or 2000-lb. bombs.
3 fighting aeroplanes for attacking other aircraft.

The weight of explosives would be:—

Torpedoes	10 tons.
Bombs	8 tons.

Evaluating the explosive attacking value of this armament as compared with a battleship, it would equal 16 broadsides in so far as the bombs were concerned or, if no torpedoes were carried but all bombs, the weight of the explosive would be approximately 36 broadsides. Now a battleship only carries some 80 broadsides, so it is fair to suggest that 3 airships would have, on the above basis, an equal attacking value.

Speed and Reliability.

The next consideration is the relative efficiency of each class in the speed of reaching its objective, its reliability in all weathers and the accuracy of attack when the objective has been reached. The speed advantage is greatly in favour of the airship and need not be further discussed. In so far as reliability is concerned, the advantage to-day is undoubtedly with the battleship, but that higher speed of airships has made possible greater reliability must not be overlooked. He would be a bold man who would be prepared to say that within a generation the airship will not be in every way as reliable as a battleship. On the authority of Captain Heinan, one of the best Zeppelin pilots, we have the fact that a Zeppelin has flown quite comfortably in an 80 m.p.h. gale and our own rigids have flown in 60 m.p.h. winds. As regards fighting power, wind affects the battleship but not the airship. It is to be doubted if a battleship could fire any of its guns in a 60 or 80 m.p.h. gale owing to the motion and spray caused by such a wind. The only difference the gale makes to the airship, however, is in the distance made good over the ground, and it is reasonable to suppose that the tactical advantages of an air attack on a Fleet at sea in a gale would be seized upon by the Air Fleet Commander.

Sufficient experience has not been obtained as to the difficulties that an airship would encounter in an electrical storm in the tropics, although German authorities do not attach much importance to any difficulties resulting therefrom. Fog should affect the airship less than the battleship, as the former can rise above the fog belt. Endurance would probably be equal, as a large airship could probably remain aloft for a fortnight.

Efficiency of Attack.

There remains the question of the relative efficiency of attack. This is too controversial a point to determine, but it seems probable that a very few years' development will greatly increase the accuracy with which bombs and torpedoes can be dropped from the air.

It would seem reasonable to assume that three of the proposed airships would have a striking power equal to that of a modern battleship, and if this be so, the financial position must be investigated as money is the life-blood of the fighting services. A modern battleship costs some £6,000,000 and the latest estimate for a 5,000,000 cubic foot airship is £175,000. Assume that the armament will cost a further £75,000, we then have a round figure of £250,000. That is, 24 airships complete with armament for the same cost as one battleship, and the same result in striking power could be obtained at one-eighth of the cost of the present battleship. If it is true it is a very vital consideration to the British Empire, as sea-power may be obtained in the future more cheaply by air-power.

The submarine is not only a relatively slow vessel on the surface but when proceeding submerged, which it must do if it is to avoid the screen of surface ships such as destroyers, light cruisers, etc., it is not only still slower but it is limited in radius of action. This defect militates against its taking other than a subsidiary place in naval operations. The airship-aeroplane, however, is not affected in this manner. It has a much higher speed and larger radius of action than a surface ship. Owing to these two advantages it is not bound or confined by any screen of floating surface vessels. It can do as the battleship used to be able to do—go where it likes and when it likes—its operations are only limited by a greater force of either floating aircraft-carriers or other airship-aeroplanes.

A Deduction from the Facts.

If this be true and the mastery of the seas depends upon securing the aerial advantage, the relative efficiency of the floating aircraft-carrier and the airship-aeroplane is a very pertinent consideration. It seems logical that the cheaper, faster, and larger radius of action carrier must in the end be adopted, as, added to these advantages, is the fact that more heavily armed surface vessels, submarines, and mines which can attack the floating aircraft-carrier are harmless against the flying carrier. However that may be, the fact remains that this latest three-dimensional vehicle can attack the battleship without first having to fight its way through the protecting screen of floating vessels. The deduction that must be drawn is so vital, so startling, that it will be met with a storm of criticism from the older school of thought. Facts are facts and must be faced, and the deduction is this:—

The battleship to-day is the prop on which cruisers, destroyers, mine-sweepers, armed merchantmen, etc., depend. Sometimes the battle fleet comes out into the open and fights as at Trafalgar; at other times it remains securely in its harbour as was the case during the greater period of the last war. But it is there, seen or unseen, and its actual or potential striking force is available: without it the whole naval power would fall like a pack of cards.

Obviously the patrol vessels, boarding vessels, anti-submarine flotillas and the like are not concerned as to the actual form of prop so long as they can depend upon it. It may be a wooden prop, as was

the wooden three-decker, a wood and iron prop as the early ironclad, a steel prop as the modern Dreadnought, or an alloy prop as would be the modern airship. It is necessary to emphasise this point as so many authorities assume that as merchandise must necessarily be transported on the seas, it naturally follows that the protection of that mercantile marine must depend upon the power of the mightiest floating vessel. Surely this is a fallacy. If the above argument is followed to its logical conclusion, science may alter not only the form and construction of the prop but its very characteristics.

Importance of Airship Development.

At first sight the eventual substitution of the airship-aeroplane for the battleship appears far fetched, but the facts from which deductions have been drawn are basic. No amount of argument will alter basic facts and the only consideration is the accuracy of those facts and, if accurate, how soon this substitution will be made. It is not suggested that battleships can be given up to-day, but surely the lesson to be drawn is that airships will have a growing influence on naval strategy and tactics and it behoves the British Government to put their "house in order" and lead the world in their development. Accepting this verdict, the final consideration is how can the British Empire lead in airship development? Technical details such as the production of a non-explosive gas, the prevention of fire by elimination of petrol, the substitution of a synthetic product to replace the gold-beaters' skin gas bags, the development of the mooring mast, thereby removing the necessity of housing airships in the sheds, etc., have now been considered. Most of these developments have already taken place, and the others are so far advanced as to make their incorporation certain.

We are concerned here with the broad aspects of the problem as only an analysis of the fundamental conditions can point the way to a sound and constructive policy of development.

The lesson history teaches in sea-power is that a fighting Navy must be broadly based upon a mercantile marine, and in the early stages of its development there was little difference between the fighter and the trader. Surely it is logical to suppose that the development of the air will follow upon the same lines. To start with, the airship will be merely a reconnaissance or auxiliary vessel, but as it develops in speed, endurance, and reliability, so will the differing requirements of war and trade necessitate a corresponding divergence of the two types. They will always have the same fundamental requirements in the way of bases, constructional facilities, trained crews, and the like, and when that stage of development has been reached the mercantile air fleet will be able to form that great auxiliary force that can be called to assist in war. The aeroplane would seem to question the correctness of this deduction from history. It is of vital importance in war but at present it is a commercial failure. But does it belie the lesson? Is not the agitation to-day to develop civil aviation in order to form this very base upon which the war strength can be built? Is it not that a great war came

when the aeroplane was so new, so undeveloped that it was not ready for war or for commerce? Is it not that air force to-day is only ancillary to our main forces—the Army and the Navy—but that the transitional period at which the air is going to become our main fighting medium is now upon the world? If this reasoning is sound, the fact emerges that airships should, so long as is possible, be developed upon a commercial basis, and when the natural growth of scientific development renders a divergence of type between the reconnaissance or auxiliary vessel and the trading vessel desirable and necessary, then that is the moment for the commencement of a State Service or Navy of specialised fighting airships.

In conclusion, it is perhaps desirable to point out that at present aircraft, either airship or aeroplane, are so undeveloped as to have but small effect in naval operations, and are but an added complication to the present scientific sea-fighting. Battleships still remain the aristocrats of the seas—but just as the political aristocrats of history have had to give way to Parliamentary Government, so it would seem that in a generation or more the battleship will be a relic of the past. The British people will require all their common sense and their genius for compromise in the difficult transitional period that is coming, but the fact that it is the Admiralty that is fighting for more aerial weapons and greater control of aerial weapons would seem to augur well for the future as showing that the greatest organisation that deals in "sea-power" is not only fully alive to the situation but means to maintain its pre-eminent position.

C. Dennis Burney.

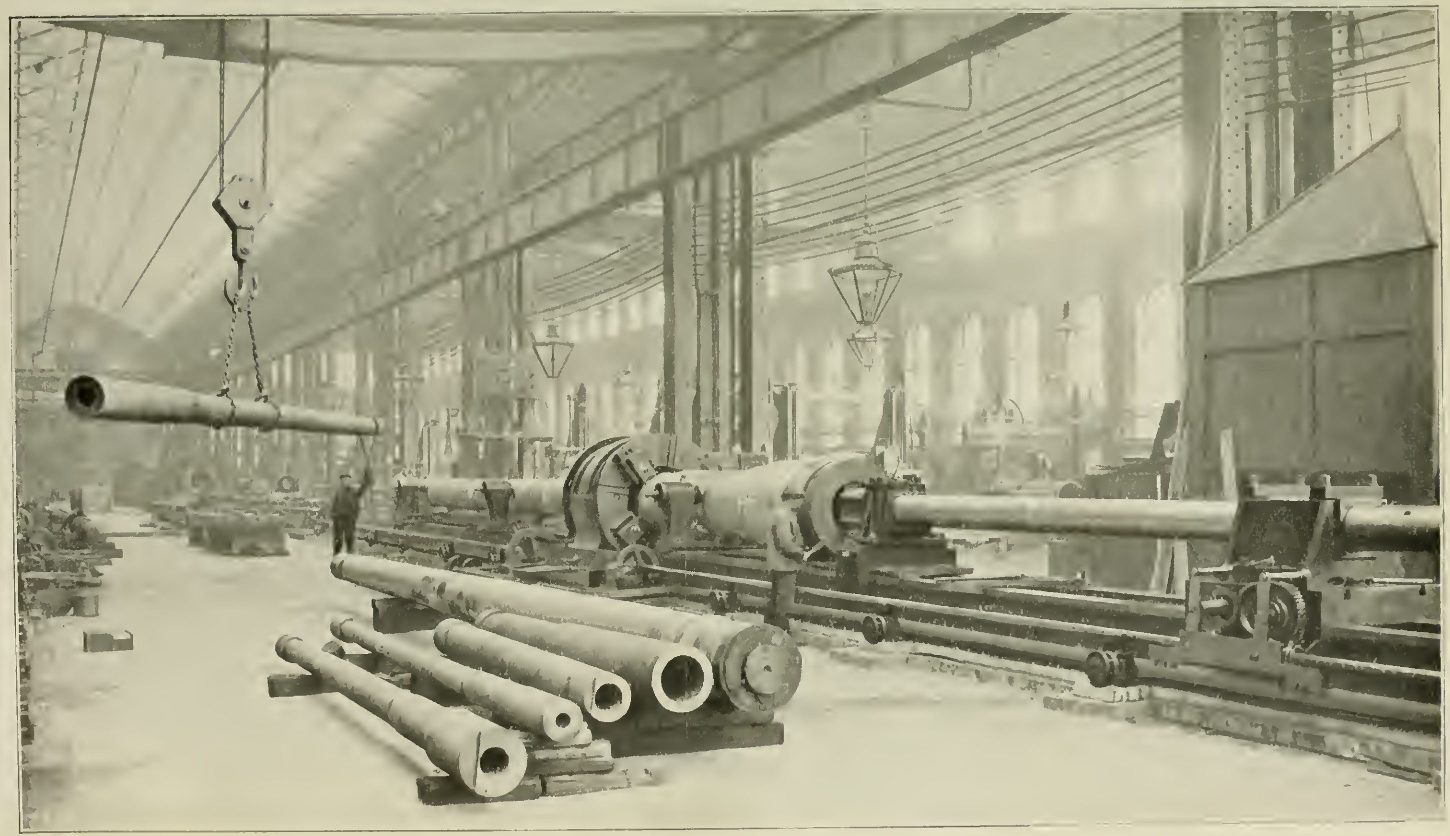
CHAPTER IX.

The Material Resources of Naval Defence.

In concluding his address as Lord Rector of Edinburgh University, Admiral of the Fleet Earl Beatty, First Sea Lord of the Admiralty, said: "I ask you to bear in mind that history shows no instance of sea supremacy once yielded being regained." That was two years ago; as a result of the Washington Conference, Great Britain has since then accepted the principle of equality in strength in capital ship and aircraft carrier with the United States. Previously, of course, our naval policy—as announced by the First Lord of the Admiralty in the House of Commons in March, 1920—had been to maintain a "One-Power Standard," *i.e.* that our Navy should not be inferior in strength to that of any other Power. The adoption of this "One-Power Naval Standard" involved the scrapping of many valuable ships and the surrendering of the great naval supremacy which Great Britain held at the time of the Armistice. This departure from our long established traditional naval policy was regarded more or less with equanimity, in view particularly of the demand for economy, as it was felt that our resources for rapid expansion alike in personnel and material would compensate, in some measure, for the reduction of the Fleet. The Washington Treaty, however, introduces an entirely new factor which may affect our mechanical resources for naval defence.

Arrangements for Expansion in Case of Emergency.

Arrangements for expansion in case of emergency are essential to naval defence. It must be remembered that the Treaty not only prescribes the capital ship strength of the signatory Powers, but also includes rules for the replacement of individual ships as they complete their term of usefulness as defined in the Treaty. Here lies the great difference between a "One-Power Standard" and what may be conveniently termed the "Treaty Standard." Under the former, the Admiralty were free to classify any ship or ships as obsolete, and to lay down others to replace them when they deemed that the progress of naval science had rendered them obsolescent. Consequently the firms which specialised in building large vessels of war and in supplying them with guns, armour, and other components, had prospects of reimbursing themselves, to some extent, for the large and continuous capital outlay involved in maintaining at a high degree of efficiency machinery and plant necessary—in many cases exclusively required—for their construction, in addition to covering costs of maintenance. With the coming of a "Treaty Standard," however,



BORING MACHINE FOR HEAVY GUNS.

these conditions no longer exist. It seems, therefore, that the following question must be asked—

Can these firms be permitted, in the interests of naval defence already defined, to destroy the vast organisations which they have built up, the non-existence of which, at a moment of sudden emergency, might mean the loss of our sea supremacy upon which the British Empire depends for its existence? If the reply is in the negative, as a corollary we must ask further: Must these firms, which have specialised in all departments to meet naval needs, be forced to suffer losses by refraining from scrapping plant which cannot be utilised for commercial purposes and by maintaining it efficiently to meet emergencies?

In order to establish the importance of these questions it is necessary to show the extent to which the Navy has relied on the armament firms for the supply of material and the degree of sea supremacy attained by their initiative in design and the reliability of productions. This involved a great enterprise and immense capital in providing and maintaining the highly specialised plant necessary for naval purposes. Much of this cannot be utilised for peace work, and other costly mechanical appliances cannot be economically used for commercial purposes, even although adaptable. If it is scrapped, it may all have to be re-built at tremendous cost of time and money. What effect would delay in an emergency have on our sea supremacy?

It must be remembered, too, that the armament firms can do what the Royal Dockyards cannot: several of them can deliver complete in every detail the largest capital ships, with the possible exception of supplying the very secret type of submerged torpedo tube. Further, the Royal Dockyards to-day have no slips on which the modern type of capital ship, even of the prescribed displacement of 35,000 tons, could be built. Last year, Mr. Amery, Parliamentary Secretary of the Admiralty, stated in the House of Commons that to lengthen the building slips at Devonport and Portsmouth sufficiently to construct a "Hood" would take, in the one case, twenty, and in the other, twenty-four months, working day and night, at a total cost of £1,000,000. He intimated that to spend this sum of money on enlarging Government slips, when at least six private firms are capable of doing the work, was not a justifiable form of capital expenditure at this juncture.

But even if the Royal Dockyards could build the hulls of modern capital ships they have to turn to the armament firms for propelling machinery, armour, guns, gun mountings, and projectiles and other component parts. During war, or in case of sudden emergency, the Royal Dockyards are fully employed in repair and refitting work.

The Works Staff.

The two questions set out already justify some review of the provisions in personnel and material made by the large firms and an estimate of the capital expense involved in connection with each of the important units which constitute a capital ship. And first as regards staff.

It is a commonplace to say that it is the man behind the gun who counts in action, but even he will not count much if his weapon is inaccurate, or its mounting defective, or if the ship on board which he is fighting cannot withstand the blows of the enemy, or if the projectiles break up before perforating. So it comes to this: Behind the man behind the gun is the skill of the experimenter, the designer, the steelmaker, and the mechanic. Co-ordination, especially in research, where theory and practice must be united, requires the maintenance of the staff intact, even though there is not sufficient money to continue experiments, which would be a serious omission. This is especially important, so that when the day of action comes the man behind the gun may not be deprived of the latest and highest efficiency in munitions which constitute the moral support which goes so far to ensure victory.

But equally important is the standing of the factory "in being." This may be established by giving an outline of some of the various processes in the construction and equipment of a capital ship, together with the capital and maintenance costs which are involved.

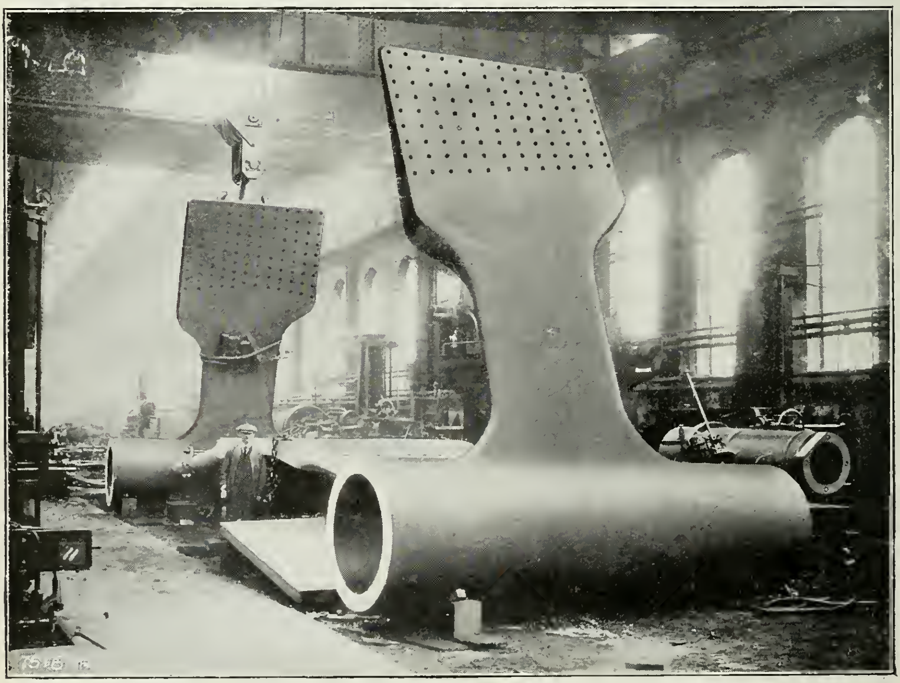
Hull and Propelling Machinery.

It may be said that the berth and plant required for the largest of merchant ships ought to suffice for a battleship. In part this is true: the converse certainly would be true. But, in the first place, the heavy weights to be handled and built into a capital ship as compared with the largest merchant ship, require special provisions, both in the foundations of the building berth and fitting-out quay and in the crane equipment. Secondly, not only is the quantity of ordinary shipbuilding materials to be handled very large, but in addition there is much work in a vessel of this nature not required in merchant vessels, even of the largest size, which, together with the short period usually allowed for the construction of these ships—a consideration of the utmost importance when rapid expansion of the Fleet has to be provided for—renders it necessary to provide buildings of larger size and variety and machine tools in greater numbers than would be required in any establishment undertaking mercantile work alone. It is not suggested that under certain circumstances, such as the construction of one of the largest liners—a "Majestic" for instance—these special facilities might not be fully utilised to some extent, but there are not enough leviathans to occupy the six or eight capital ship berths and the shops required for the construction of their machinery.

For instance, the present-day capital value of an establishment laid out to deal with large capital ships is approximately £1,700,000, of which about one-third is attributable to the special provisions made for dealing with the class of work now under review. The building berth, for instance, requires to be 950 ft. in length, and of a width of 120 ft.; owing to the heavy launching weight, the foundations must be of the most rigid description, involving heavy piling and concrete flooring. The approaches to the building berth, too, require to be specially constructed to permit transportation of the

HOLLOW FORGED-STEEL PROPELLER SHAFT FOR WARSHIP.

Note : The shaft is 86 ft. 6 ins. long and 23½ ins. in diameter. The diameter of the hole varies from 8 ins. to 18½ ins

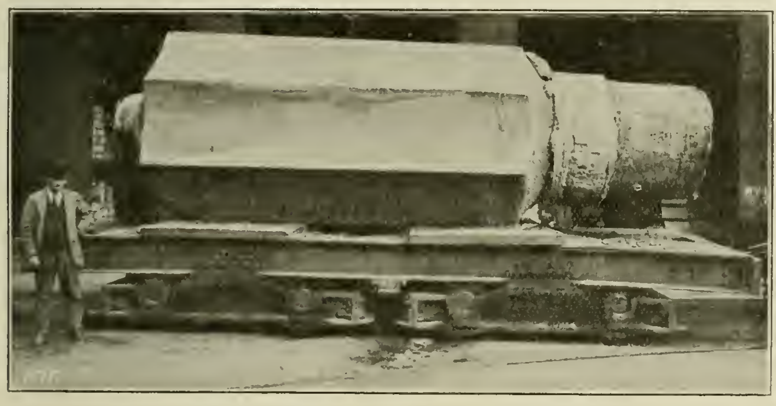


PAIR OF CAST-STEEL PROPELLER BRACKETS FOR A BATTLESHIP.

Note : The castings weigh 97¼ tons.

armour plates and other heavy materials to the ship, while special cranes are necessary to deal with the heavy lifts involved. At the fitting-out quay, also, special provisions are necessary, including a crane to lift at least 200 tons in order to ship the heavy parts of the armament.

The huge castings and forgings required in capital ship construction form another item necessitating plant which is too large to produce economically the castings required in commercial practice. The heavy castings include stern frames, propeller brackets, rudders, and stems, for which a steel melting capacity is necessary to enable a casting of 100 tons to be made at one time. For ordinary commercial needs one-third of this capacity only is required. Indeed, the same



127-Ton Steel Ingot for Gun Tube.

applies generally to other processes. Large forgings for turbines and propelling machinery, for instance, require, on account of their dimensions, plant which it is not economical to employ in commercial work. The present-day additional capital cost to an establishment which makes provision for dealing with the heavy castings necessary for capital ships is about £157,200 ; while the annual cost of maintenance when there is no work in hand, together with depreciation and interest, amounts to a very substantial sum.

Gun Building.

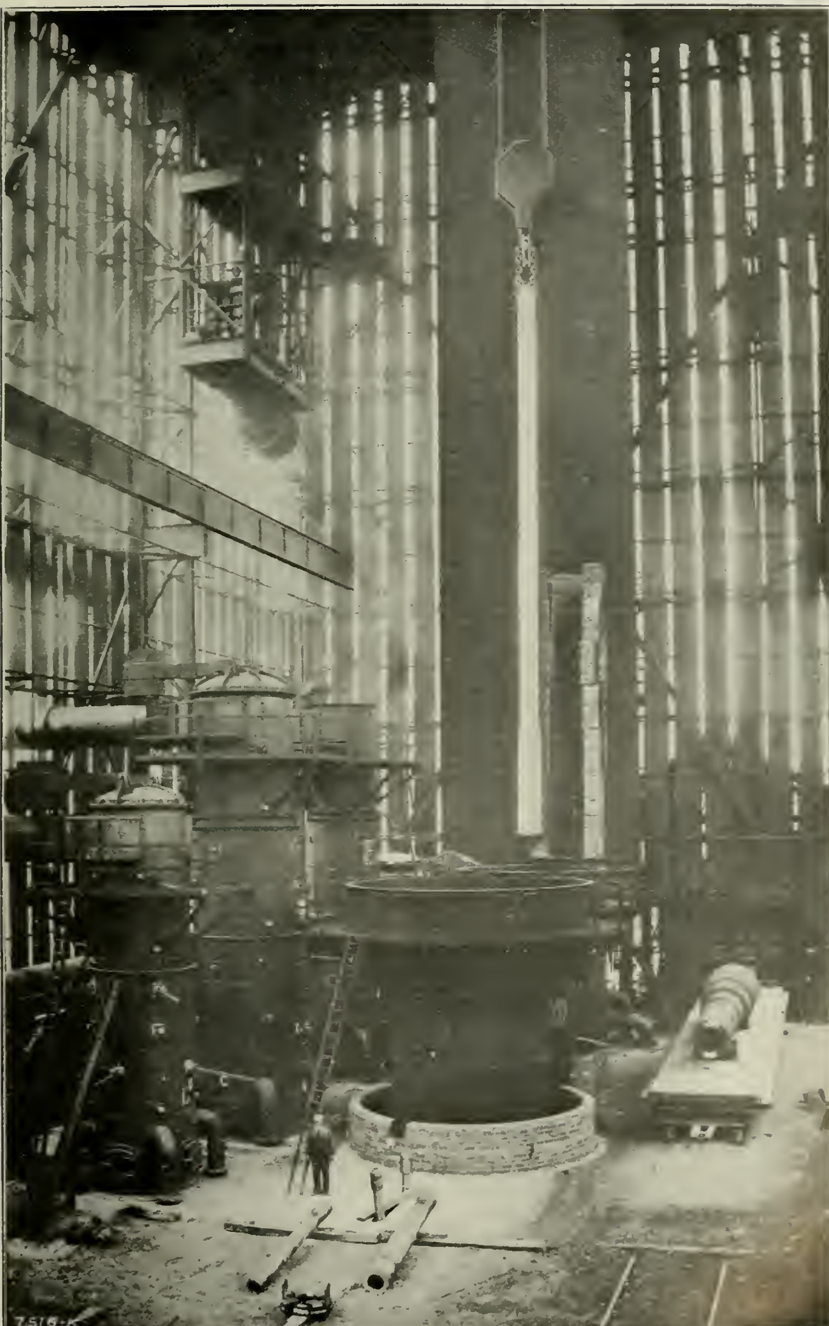
In the construction of the largest guns, the steel melting, forging, and machining plant requires to be so large that it is difficult to find sufficient peace work to justify their massive proportions. As regards the first, the largest naval guns are over 60 feet in length, weigh over 100 tons, and it takes not less than 12 months to produce one. Although the gun only weighs 100 tons in the finished machined condition, about 500 tons of ingots are necessary to make the required forgings. The larger size of ingots weigh up to 127 tons each. These facts alone prove the immensity of the plant necessary and the number of processes which have to be gone through before the gun is finished, apart altogether from the question

of extreme accuracy. The melting furnaces are of 60 tons capacity, the ladles into which the molten steel is run are suspended from cranes of 200 tons lifting power. The forging presses, which form the steel into the desired shape for machining, are capable of exerting pressure up to 10,000 tons, and proportionately large cranes and other tools are necessary to handle the ingots during the forging process. Again, the cranes of 200 tons lifting capacity are placed one on each side of the hydraulic press, and are fitted with special turning gear for revolving the billet whilst being forged under the press. Four weeks may be taken in continuous work on a gun tube. Obviously such powerful plant cannot be in everyday demand for purely commercial purposes.

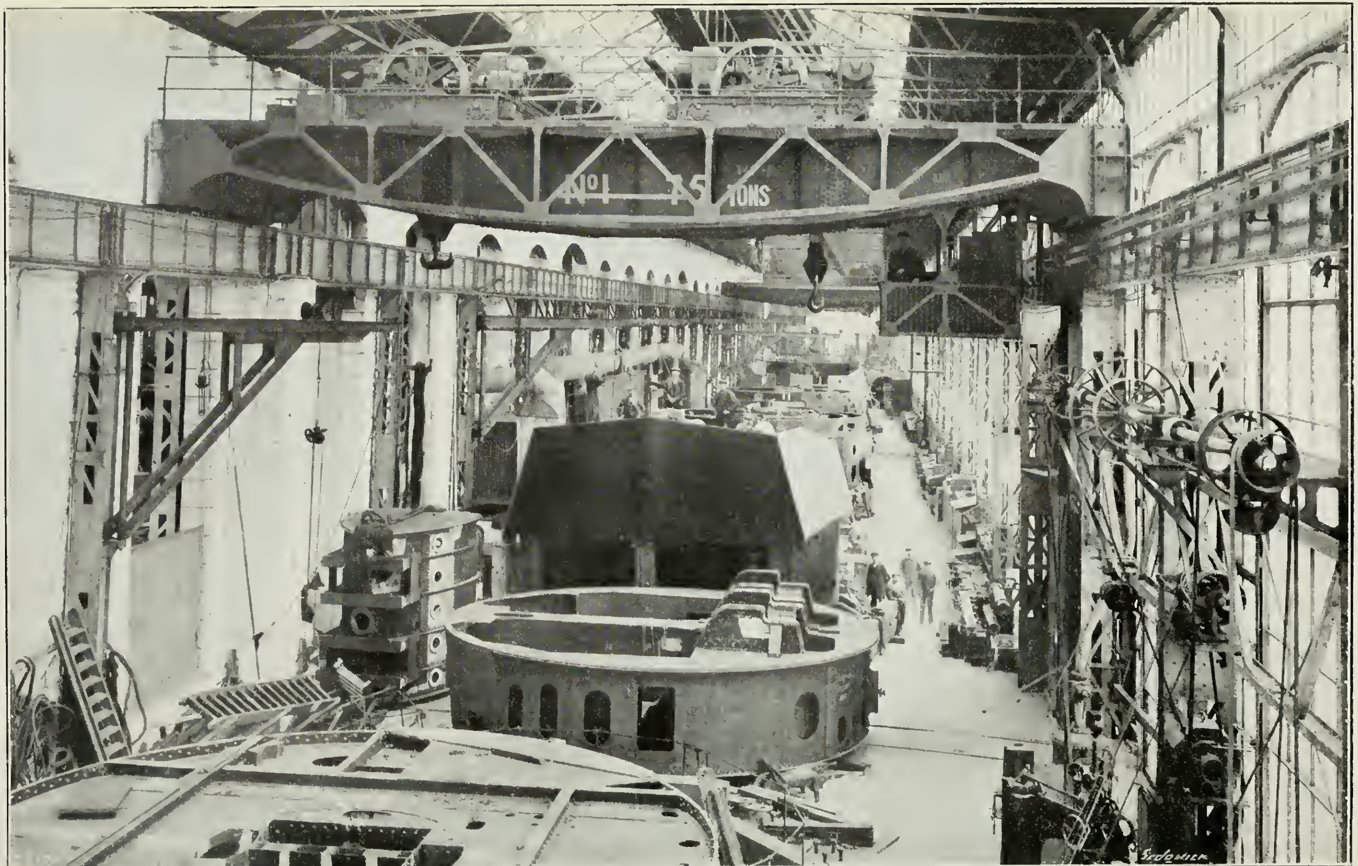
The machine tools are equally striking in their magnitude, and many are quite unsuited for any other than ordnance manufacture. For instance, an A tube forging, weighing approximately 47 tons, is rough turned in a lathe, with bed 70 ft. to 75 ft. long, driven by 40 to 50 H.P. motors, and served by a 100 tons crane. It is true this may be used for large propeller shafts; but the gun-boring machine, larger even and as expensive, cannot be employed for other work. There is also the wire winding machine, and this is but one of many machines.

Still more striking in size, cost, and uselessness in other work than gun making, is the plant for the heat treatment and building up of gun tubes. To begin with, there is a crane of 130 tons lifting capacity and a clear lift of over 100 ft. above ground level—the latter a most unusual requirement. This is necessary because while the oil soaking pits, containing 126 tons of oil, are carried to a depth of about 90 ft. below ground level, the furnaces over these pits extend 75 ft. above floor level. The gun tube, it may be interjected, is passed into the furnace, which is gas fired, heated to the required temperature as checked by pyrometers, and then lowered into the oil tank. There are such processes for the several tubes which make up the gun, and these tubes, after being machined by heavy special tools, are shrunk the one over the others in proper sequence by the use of similar furnaces. The outer tube to be shrunk over the inner tube must be heated in a furnace above ground level, 75 ft. high, with vertical doors the full depth of the furnace. The shrinking on is done in the lower furnace. The breech mechanism in itself requires very special tools.

From first to last the plant is massive and costly and of a character requiring as continuous work as possible in the interests of economy and reliability. At present-day prices, the capital cost of the special appliances necessary for manufacture of the largest naval guns may be taken to be round about £1,000,000. This estimate does not, however, include the cost of land or buildings. To maintain the directing and other staff specially engaged for the various processes and the plant itself during a period when there is no work in hand, but in a state of readiness should an emergency arise, would involve a heavy annual cost.



FURNACES AND OIL TANKS FOR HEAT TREATMENT OF GUN TUBES.



GUN-MOUNTING DEPARTMENT OF ARMAMENT WORKS.

Gun Mountings.

The case of the manufacture of mountings for large guns differs only in degree. The primary necessity is great skill and experience in design, precision in machining the parts, and reliability in material and workmanship; in other words, mechanical engineering of the highest order. But the machine tools are more or less adaptable for commercial work, if sufficiently heavy work can be got. As in the case of gun construction, very powerful overhead cranes are required, and these, of course, involve heavy constructional columns to carry the cranes and their load. But the capital expenditure of the least utility for peace work is absorbed in the great deep pits built of substantial brickwork to a depth of about 50 ft. below floor level and of a diameter at top of 15 ft. and at bottom of 40 ft. with stairways, electric power, and light distribution. In each pit is built the twin or triple gun-mounting from the loading base in the magazine to the shield for protecting the gun. This, completed, may represent a weight of 1500 tons, including the three 16-inch guns.

There is first the plate and angle "housing" for the guns—a structure comprising 230 tons of steel plates and bars, within which is built up the training, elevating, hoisting, and loading gears, gun washout plant, sighting and firing apparatus, electrical and auxiliary pumping machinery, together with flash-proof doors and interlocking safety devices. The turntable itself for a triple 16-in. gun turret will be about 37 ft. in diameter, and it must be dead true as to level—variations must not exceed a thousandth of an inch to ensure accuracy of gunfire. Strength and good riveting work are essential on account of the vibrations and racking strains induced by gunfire. Supported on the plate work of the turntable, in addition to the working chamber and trunk, is the main and the auxiliary machinery weighing about 300 tons.

This turntable carrying the oscillating parts and the guns, and also the armoured shield, are all erected complete, thus requiring a shop of extraordinary width and height as well as adequate overhead crane power. In view of the great weights the selection of, and preparation of the ground, the pit and the structural work for the purpose, is of the greatest importance involving heavy cost. The manufacture of a turret may take from eighteen months to two years and the mountings may be on the erecting pits from four to six months for testing, etc. Certain parts of the oscillating gear are subjected to further tests, for which purpose they are sent to the proving ground. The proving ground itself requires an extensive equipment to complete its work and is provided with lifting appliances for the heaviest class of ordnance, power plants, and magazines. After these tests, the mounting, having been sufficiently dismantled, is transported to the dockside from which it is lifted on board the ship.

The capital cost of an establishment able to construct mountings for triple 16-in. guns may be taken to be nearly £700,000. It follows that upkeep per annum to meet naval emergency must be very great.

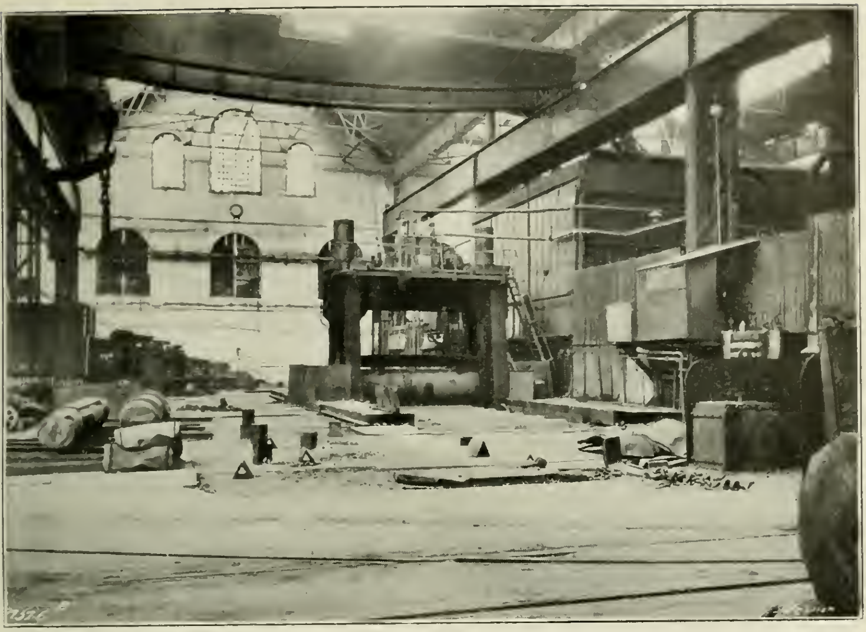
Armour Plates.

The plant for manufacturing armour plates is of special construction, made excessively heavy and strong, and is not adaptable for use in ordinary commercial work. The plates on a modern battleship are now of larger dimensions than formerly, to resist the attack due to the improvements made in armour-piercing projectiles with a muzzle energy of 100,000 ft.-tons.

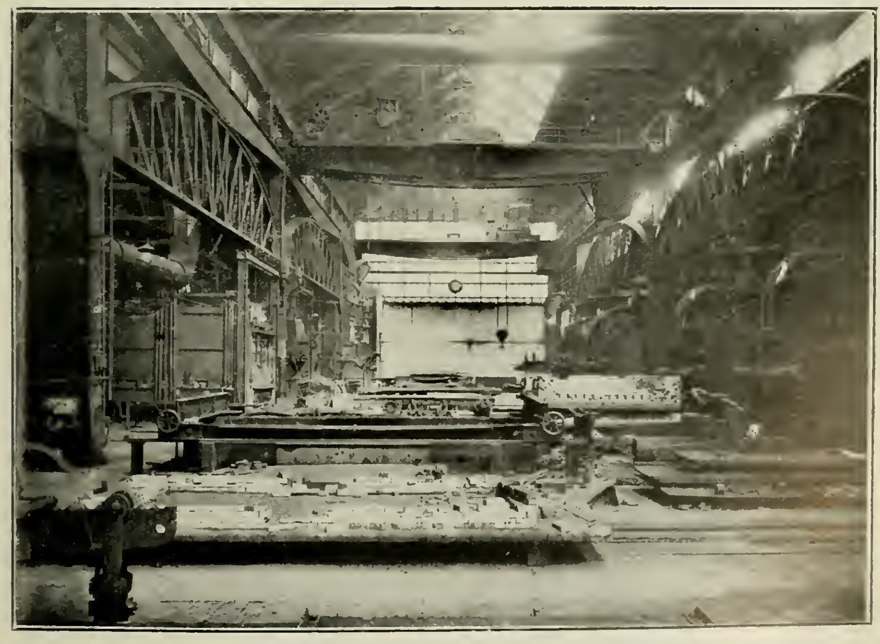
As to the steel-making furnaces special provision is required, as owing to the high content of nickel and chromium, it is necessary to obtain a high temperature during the melting down and working of the charge, and this shortens the life of a furnace very considerably as compared with ordinary commercial work. The specially designed melting furnaces themselves require to be of a large size as ingots up to 80 and 100 tons in weight have to be dealt with. The cast-iron moulds are specially designed to obtain sound ingots and uniformity of composition, and of great size. The forging is carried out by means of a 12,000 ton hydraulic press, as a result of which the thickness is reduced, in some cases, from 60 in. to 40 in.

The forged slab having been heated, is rolled in an exceptionally powerful mill capable of dealing with plates up to 15 ft. wide by 50 ft. long. After heat treatment in special furnaces, the plate is straightened under a 10,000 tons hydraulic press. A large planing machine brings it to the required thickness. The next process is carburising, which involves the use of special furnaces for from two to three weeks, during which carbon is absorbed on the face. And so on, including hardening—all processes requiring special plant. Very drastic tests follow each operation in order to ascertain if the plate is in a satisfactory physical condition. There is no middle way in armour—a plate is either right or wrong, and if there is the slightest doubt it must be re-treated, when possible, or may have to be rejected after immense sums have been spent on its manufacture.

It will be realised from this short description of operations that the plant required is necessarily heavy and costly. To provide at present-day prices for an establishment capable of an annual output of 10,000 tons would involve a capital cost of about £1,000,000 to £1,500,000. Should there be no work in hand, the cost of maintaining the directing and other essential staff and of keeping up the plant ready and efficient would come to a total of not less than £100,000 to £150,000 per annum under these headings, interest on capital not being included. Research and experiment plays a prominent part in armour plate manufacture, as indeed it does in all spheres of armament work. The cost of this work is high, and as it is essential to the progress of naval science it must be taken into consideration as a current expense when work is slack. The cost, of course, varies, but £15,000 per annum is considered to be a conservative estimate for the combined expenses for this class of work to a firm which executes armament work of different natures. Can we afford to let our resources in this respect essential to naval defence fade into decay or be scrapped ?



ROLLING MILL FOR ARMOUR PLATES



CARBURISING FURNACES FOR ARMOUR PLATES.

PLANING MACHINES FOR ARMOUR PLATES.

MACHINES AND HEAVY OVERHEAD CRANES FOR ARMOUR PLATES.

Projectiles.

The manufacture of armour-piercing shells is a branch of armament production which, while less spectacular, is no less important than the heavier work previously dealt with in this chapter. Indeed, the principle underlying the dictum that the strongest defence is irresistible attack, has never been better exemplified than in this particular case. The fastest ships, the most rapid fire, the most modern protection and the highest training of the ship's personnel is all of no avail if when the projectile reaches the target it fails in its designed duty, the perforation of the enemy's defence.

At the present moment our country is pre-eminent in the manufacture and performance of armour-piercing projectiles, and failure to maintain this position consequently entails the loss of the whole structure. Enormous sums of public and private money have been spent in experiments to enable British manufacturers to attain the existing excellence, while some of the best of British metallurgical experts have for many years spent a very large proportion of time on this particular problem, and must continue to do so if the British Naval Service is to maintain the position it now holds in this respect. The manufacture of these projectiles, if they are to be of consistent quality, demands special plant, which is useless for any other purpose; and such plant must be multiplied to provide for the production of supplies in quantity sufficient to meet any reasonable emergency, while the maintenance of a trained staff to operate the plant through all stages of manufacture is of vital importance, if when the emergency arises the quality of the product is to be depended upon.

The ultimate value of an armour-piercing shell depends upon each step in its manufacture, and it is necessary, in order to ensure success, that close supervision and attention should commence with the raw materials used in the composition of the steel from which it is made, and end only with the final mechanical touches of the finished projectile. This involves special laboratory supervision, special furnaces, forging presses, lathes and machines, and heat-treating equipment, each with its own special lifting apparatus, the cost of which at present-day prices, together with the buildings in which they must be installed, would total £2,000,000 for a modest requirement of 500 16-in. projectiles per week, and the installation of such a plant could not be effected in less than 6 to 8 months, by which time the lack of supplies might well have involved consequences fatal to our naval position. Similarly the trained and experienced staff, once dispersed, could never in actual practice be again collected.

It must be remembered that metallurgical science is always progressing, and that the Navy that fails to take advantage of these advances in the quality of its armour-piercing projectiles loses its main weapon of defence. Constant research and experiment are necessary to keep up to date, and the truest economy lies in continuing to manufacture sufficient projectiles to provide for the

continuance of experimental work and the advancement of the technique of the experts. It has time and again been proved possible to produce "specimen" projectiles which achieve marvellous results, but it is only by continuous manufacture that these results can be repeated by shells selected from those produced in quantity.

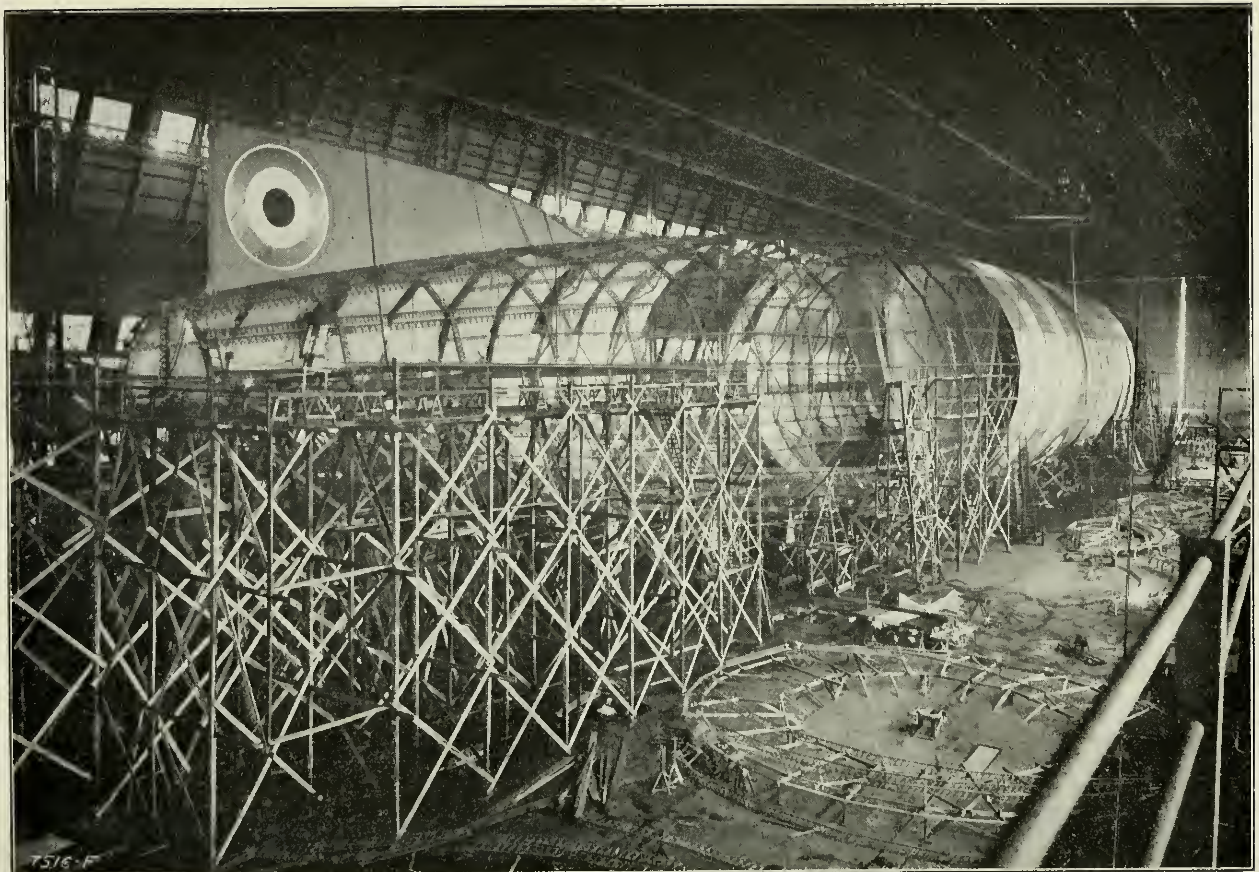
Shell Filling.

For safety purposes it is a vital necessity that an establishment in which high explosives are handled or manufactured should be of an entirely different character to an ordinary commercial concern. In the latter, proximity to each other of the buildings or shops in which the various processes are carried out is a primary consideration; while, in the case of the former, a series of widely spaced buildings is necessary, each forming a unit handling such quantities of explosive as are considered reasonably safe. In addition, a highly technical organisation, combined with research and medical staffs, are essential. Such an establishment must, therefore, be specially built. That being so, the output of filled shells in an emergency, and for some considerable time afterwards, is limited to the capacity of any establishments which may be retained under peace conditions.

It is calculated that, at present-day prices, the capital cost of a shell-filling establishment similar to the Morecambe National Filling Factory, constructed during the war, with an output of 350 tons per week, would be round about £1,500,000; its annual cost, excluding depreciation charges, would be £175,000.

Fire-Control Instruments.

No discussion of the mechanical resources necessary to the equipment of a capital ship would be complete without reference to fire-control, the instruments for which grow more and more complex as the science of naval gunnery develops. All the actions of "the man behind the gun" are controlled by the fire-control officer far distant from the gun positions. The guns at the moment of firing do not point to the target, nor are they firing at the momentary range of the target, but provision for many varying factors, some of them very complex, has to be made if the shots are to hit the target. Not only has the range of the target to be accurately known, but the guns have to be directed to the position which the target will reach at the same moment as the shots, and, seeing that in the ranges which one must look for in a modern naval action, the shots may take as long as half a minute to cover the intervening distance, considerable changes occur in the distance and bearing of the target during this time. Barometer, temperature, wind, as well as roll and yaw of the ship firing her guns and other factors, all enter into this problem, and it must now be recognised that the ships provided with the best system of fire-control have advanced far towards winning any fight into which they are brought on otherwise even terms. If these factors are complex, as we have no doubt the reader will



RIGID AIRSHIP UNDER CONSTRUCTION IN SHED.

Note : The circular frame on the floor in the foreground has a diameter of 80 ft.

appreciate, what does the future hold in store in the possibility of firing from behind smoke screens, or at such extreme ranges that mists obscure the target, thus preventing any sighting even from the director position on the mast, or of such indirect firing as was carried out in the Dardanelles?

The initial problem in fire-control is that of finding the range. The rangefinder of to-day represents the work of opticians and scientists extending over twenty years. Improvements in accuracy and performance have been continuous, and the limit of possibility with this instrument appears to have been about reached with a present working range of naval gunnery of from 20,000 to 30,000 yards. With the base length of the rangefinder varying from 15 to 40 ft., it can be appreciated that a very high degree of accuracy is required in its construction, both optical and mechanical.

The same applies to the construction of the periscopes and other sighting instruments; a class of work in which there is no corresponding line in ordinary commercial work. In the case of the periscope, for instance, the optical difficulties of transmitting light rays along a length of 20 or 30 feet and yet retaining sufficient brilliance of illumination, are great, and have only been attained by the most careful thought and development. So with the other component parts, mechanical and electrical, great delicacy of construction is necessary. If the fire-control gear is faulty a ship's gunfire suffers accordingly, and battles may be lost thereby.

The installation of a fire-control system in a capital ship involves work of large proportions and heavy costs; which in its turn necessitates large capital costs in plant and machinery, while the capital involved in the training of staffs and skilled men can hardly be estimated. To have, at a moment when the fate of the Empire may depend on the Navy, an insufficient organisation for supplying it with the accurate fire-control appliances that are necessary in order to hit the enemy, may very well spell disaster.

Airships.

Any survey of the material resources of naval defence would be incomplete that did not contain a reference to plant for constructing aircraft, which to-day may be considered to form an integral part of a navy; while in case of war the belligerent whose fleet was deficient on its aerial side would labour under a tremendous disadvantage, possibly irrecoverable. As at the present moment it is impossible to prophesy as to the commercial future of the air, it becomes more than ever necessary to examine the arrangements and expenditure that would be entailed in order to be able to produce aircraft in sufficient numbers in case of national emergency.

In airship construction, special consideration has to be given to the selection and preparation of the site of the establishment. Assuming a purely constructional establishment, where there would probably never be more than one ship handled on the ground at once, an area of about 250 acres would suffice. The site would require to be as level as possible; clear of trees and obstructions on the actual landing

ground, and with surrounding physical features least calculated to cause local disturbances of the air likely to affect the manœuvring of the ships. The site, also, should be some distance from any large town. The purchase price would, of course, vary according to the position and relative agricultural value, and may be placed at £15,000; its preparation costing about £2,000.

Those who have seen a shed for housing large rigid airships must have been impressed by the immense size. At a constructional establishment, a double shed would be necessary, capable of taking two of the largest airships built in modern practice, with a reasonable allowance for development in size—say up to fifty per cent larger than "R 38." The workshops, stores, and offices necessary to deal with all the work incidental to building, except fabric work, would be arranged as annexes to this vast building. Fabric items would be prepared in a separate building which requires to be of considerable extent; that portion used for testing gasbags up to full size under hydrogen gas pressure requiring a height of sixty feet. Other detached buildings are necessary for use as power house, gas producing plant house, and so on. All these must be placed at an appreciable distance from the main buildings. Finally, an outside mooring mast, complete with water, gas, and petrol main connections, for handling ships during tests and trials, would require to be provided.

The cost of the buildings above described, with necessary roads, piping, and electric installation, etc., but without plant, gear, or stores of any kind, would be, at present-day prices, approximately £260,000. The expense of gas producing plant, fixed plant, and movable plant and gear would run to about £65,000. So that, in all, the installation of a single airship constructional establishment would entail a capital outlay of £342,000.

For airship construction none of the heavy plant and machines of the type used for the building of guns or manufacture of armour plate are necessary. But, on the other hand, the stresses and strains which have to be borne by an airship involve most careful preparations in design and skilful supervision in building. In this connection it is of interest to indicate the various natures of trades employed in airship building. They are: joiners, fitters, sheet metal workers, coppersmiths, toolsmiths and die sinkers, painters, riggers, machinemen, blacksmiths, electricians, and handymen. Girls have been found very suitable for the fabric work, which includes: gold-beater skin scraping and cleaning, cutting fabric to required sizes, sticking skins to fabric with rubber solution, stitching by machine to form the completed gasbag and the preparation of the outer cover. With normal work the average number employed would be 200 tradesmen, 200 handymen, and 600 females, with an administrative staff of 50. To maintain such an establishment in readiness to proceed at short notice, when there is no work in hand, would involve a sum of at least £7,000 per annum to provide even a nucleus of the necessary staff and tradesmen. The upkeep of buildings and plant under the same conditions would cost at least £15,000 annually.

Regarding the commercial value of an establishment of this

nature, this, as explained earlier, depends primarily on the future of aircraft commercially; but while it may be said that the shops and plant might be used for the manufacture of many small articles of general utility, the whole is so complicated and costly in its equipment that it would not be efficient or remunerative.

Aeroplanes.

While it is probably true to say that in the event of emergency, there are many firms in the country who could, in time, turn their plant to the production of aeroplanes, it is nevertheless necessary to examine the question of maintaining in being the nucleus of an organisation capable of immediate and rapid expansion. There is, for instance, an urgent necessity for keeping in existence the experimental research and tunnel work, which, in the case of an individual firm, if it is to produce good results, must aim at the designing and building experimentally of at least one new machine each year. As aviation is in its infancy, progress depends upon this. If all the work of this nature is conducted at the existing Government establishments design is apt to become stereotyped, whereas private enterprise will lead to progressive advance. The cost to a private firm of an organisation of this description is estimated to be at least £10,000 per annum.

The cost of maintaining the nucleus of an establishment capable, when in full working order, of producing ten to twelve single-seater aeroplanes per week, or their equivalent in larger machines, would be approximately £23,000 per annum, making with experimental research work a total of £33,000. But what would be the use of ten or twelve aeroplanes a week, when we have to visualise the employment of aircraft in thousands during the opening stages of a war?

Conclusion.

In a review of this nature it has been impossible either to deal expansively with each particular subject or to cover all of the various activities that have grown up in the sphere of warship construction and equipment. All that could be done is to point out the national importance of the work of the armament firms and to show how, alone, the Royal Dockyards and other Government establishments can only provide a proportion of the components which go to produce a fully-equipped capital ship. In this respect, also, it should not be forgotten that, in the interests of economy and in view of the Washington Treaty, the Royal Dockyards and Allied establishments have been so reduced that they are only capable of dealing with the current work and requirements of a relatively small fleet. Nor must it be overlooked that the main reason for the birth of the armament firms in the past was the Government's neglect to provide the means of keeping pace with the advance in naval science.

Of the vital importance of the work performed by the armament firms during the war it is unnecessary to speak here. But it is

germane to the subject to ask: What would have been our situation if these firms, with their special machinery and plant, workmen, and highly technical staff, had not been in existence? To this there seems to be only one answer: We should have gone under, simply because our navy and army would not have had the equipment which is necessary to success in modern warfare. Nor must it be forgotten that the existing armament firms provided the brains and the nucleus from which arose the suddenly improvised producing organisation all over the country.

All the treaties in the world will not ensure a lasting peace, but conscious strength may, as it has done before, prove the means of avoiding a conflict. Surely, then, we should see to it that we maintain in our hands the sources from which a large portion of our naval strength is drawn. To permit the specialised plant and skill of the armament firms to die of inanition, when it is possible to initiate steps which will secure it in health ready for intensive use if required, will be analogous to allowing one of our arms to wither when it could be saved by prompt medical attention.

"Time," said Nelson, "time is everything, five minutes makes the difference between victory and defeat." It may be that success or failure in the next great war, in which we may unfortunately find ourselves engaged, will depend on the time it takes to get our armament production plants working at full blast. This time will be governed by the type of organisation retained as a nucleus in the years of peace.

THE EDITORS.

CHAPTER X.

The Strategic Problem of the Pacific.

The most careful and accurate description of the Central Pacific comes from a German pen;* and after mastering it one is still prompted to ask: In what does the problem of the Pacific consist? If we except the Eastern Archipelago, of which the Philippines form a part, none of the island groups contain resources of any importance to a modern state. The copra and cocoanut palms in which they abound have never been the objects of great industrial enterprises; and such commerce as exists in those commodities has always been carried on by small trading companies, not comparable with the vast organisations which exploit the mineral resources of the globe.

The races which inhabit the islands are neither numerous nor adaptable; and if any one state absorbed the entire insular territory of the ocean, it is most improbable that she would thereby increase her armies by a single division of disciplined troops. How then can rivalry or friction between great Powers spring from the possession of territory so insignificant in commercial value, and so resourceless in the factors which build up colonial power?

Nor would these reflections exhaust the question. At the south-west corner of the Pacific a vast archipelago extends from New Guinea to the Malay peninsula. In contrast to the valueless island groups of the central basin, it contains territory of enormous natural wealth; several of its islands are inhabited by native races which have grown up under the civilising impulses of the great religious systems of the East; and two-thirds of this tremendous archipelago are under the jurisdiction of one small European state—Holland. That state possesses no naval or military force proportionate to her vast colonial empire; nor could she defend herself against an attack by one of the great Powers. And yet Holland peacefully holds this great territory without exciting the envy of a single neighbour; and when the colonial policies of Great Britain, France, and Germany were most actively prosecuted, the Dutch Eastern Archipelago never became the object of their ambition or rivalry.

The Great Powers in the Pacific.

If international morals permit this, why should the central groups ever excite a single contention or give rise to the most transient friction? The answer to the question is that international rivalry consists not in the value of particular acquisitions, but in the power

* Dr. Hans Mayer: "Das Deutsche Kolonialreich," vol. ii.

of the states which strive to acquire them; and the palm bearing atolls of the central Pacific derive their explosive force from the fact that three Powers, roughly equal in military resources, have divided them amongst themselves. The reservation is necessary, for each one of those three Powers has advantages peculiar to herself: Japan compensates for the numerical inferiority of her fleet by her special position; Great Britain is connected to her outlying ports in the Pacific by a chain of possessions and dominions; and America balances certain strategical disadvantages in the ocean itself, by her vast wealth, and by having, on her northern frontier, a defenceless neighbour, dependent for her very life upon the Pacific trade routes. The problem, which every one knows to exist, though its exact nature is not clear, is, therefore, a repetition of what has often troubled European history: the balance of power. No single one of the three great maritime states with possessions in the Pacific can allow the other a preponderating position. American opinion feels that the Peace Treaty of Versailles did give an unfair advantage to Japan, and became exasperated in consequence. What, then, was that advantage, and how far have the Americans redressed it by the negotiations which have just come to an end?

America's New Responsibilities.

The Spanish-American War gave a peculiar turn to American history, and presented the United States with responsibilities which her past experience had not taught her how to carry. Up to that time, her expansion had resembled the migratory movements of prehistoric Europe; her people had spread over territories essential to their existence; and the original possessors of the land had been exterminated or completely subdued in the process. But the possession of the Spanish Philippines was prompted by no necessity of the kind, and was a mere consequence of success in war. The industrial progress of America was at the time proceeding with unexampled success; and no colonial movement was to be expected from a people inhabiting a country where wealth simply sprang up from the ground. Even if the Americans had colonised the newly acquired islands, it is doubtful whether the history of the Filipinos would have resembled that of the Red Indians; and so, faced with this new situation, the American Government adopted the only course open to it. It set up a protectorate, and endeavoured to educate the Filipinos by the ordinary, direct method of setting up schools; of enforcing regulations upon public morals and hygiene; of introducing American civil law, as far as it could be introduced; and by the indirect method of employing the native races in subordinate positions in the public departments of government; and of associating them in commercial enterprises.

There can be only one outcome to this endeavour. The Philippines will become a tropical outpost of America; and the United States will value its possession in direct proportion to the success of its efforts. As the educating process continues, so the islands will absorb more American thought, and radiate more American policy.

At the present moment the process has gone just far enough for it to be vital to the United States that her free communication with Manila should never be threatened by any neighbouring State: it is threatened, it is claimed, by the Treaty of Versailles, and herein lies the whole problem.

A Strategic Problem.

Manila lies 650 miles from Formosa, 1,300 miles from Nagasaki, and 6,200 miles from San Francisco. This in itself is a disadvantage; but the great distance between the United States and her colony is accentuated by the fact that Japan is now the mandatory Power for whole groups of islands lying right athwart the direct route.

These long distances are, in their turn, aggravated by the peculiar limitations of a modern fleet. After a whole century of inventions in mechanical transport, a fleet of modern ships cannot effectively operate away from its bases. It may be possible for a bold leader like von Spee to carry a squadron across an entire ocean; and commerce raiders may operate over great distances: the regular exercise of sea power; the methodical use of maritime predominance has been exerted over a decreasing radius as inventions have multiplied; and, at the present day, a fully equipped fleet, accompanied by its full complement of auxiliary craft, can only remain at sea for three days.

Considerations like these show how completely isolated the outlying possessions of a great state may be. Our own were safe, in the late war, by virtue of our position in the North Sea; with other opponents it would have been another matter.

The figures given show that Manila and the Philippines are a particular case of this isolation. The most powerful fleet based on San Francisco would never protect Manila from attack; and the naval problem confronting the United States is peculiarly grave.

Protection of the Philippines.

Her constitution and national prejudices forbid that a large permanent military force should be stationed outside her boundaries; and public opinion would never allow huge American garrisons in the Philippines. It sanctions a small military nucleus to man the fortifications and police the country; but that is all. The first elements of sound policy exclude the raising and drilling of a large Filipino force. The defence of the colony must therefore be on the sea; and if on the sea, it can only consist in a powerful coast defence force of battleships, monitors, and submarines, independent of home supplies for long periods, and based on a harbour equipped with all the appliances of modern industry. That is, Manila must be a fortified port, an arsenal, a dockyard, and a factory for making munitions of war. The resources of the mother country are certainly equal to supplying the plant, the iron, the fuel, and the chemicals necessary for equipping such a depôt, but it is none the less a big undertaking for any country however wealthy.

This was the first alternative which has confronted the United

States during the past few years; the second was even more arduous. It was to bridge the gap between the mother country and the colony by territorial acquisitions. This was only possible by war; and the Americans do not like war. The third was to ease the situation by diplomacy, and this was actually adopted; and it is therefore necessary to see how far the results of the Washington Conference have relieved the position. A few general remarks on the conduct of naval war are needful before the question can be examined further.

The Influence of the Washington Conference.

War between maritime states falls into two divisions: the operations of the first line squadrons, and the subsidiary projects carried out by the second line fleet and auxiliaries. The first consists in obtaining a base from which an adversary's principal fleet may be watched and struck at if it endeavours to dispute command of the sea; and in carrying out such sweeps and cruises as are necessary for the purpose. Great battles at sea are very rare, and this duty generally resolves itself into waiting for an opportunity; and being ready to seize it when it comes. This was what our main fleets were called upon to do in our long wars with France; and from 1914 to 1918 the Grand Fleet at Scapa played the same part. Only once was the vigil broken by battle.

The work of the secondary fleets is of a wholly different kind; for it falls to them to exploit the advantages of the first line's vigilance and readiness. On the second line devolves the arduous duties of convoy, of trade route patrol, of supporting overseas expeditions, and of local defence. In strange contrast to the monotonous routine of the main fleet, the activities of the second line are variable and incessant, but it may be said that of all the duties which it is called upon to carry out, that of supporting expeditions is the most important and arduous. Now a very casual glance at the Pacific shows that, whichever of the three great Powers were at war, combined overseas expeditions would be the main feature of the campaigns. If we were at war with America, we could only counterbalance the loss of Canada—which would be inevitable—by seizing the Philippines; and, if possible, by finding some Salonica on American soil and holding it against all opposition.* If with Japan, the struggle would centre round Singapore, Hong Kong, and Formosa; and finally, if war broke out between Japan and America, each side would concentrate its effort upon seizing and holding the outlying possessions of the other. San Francisco and Tokyo would be little disturbed; Guam, Manila, and Formosa would each be the theatre of a desperate conflict.

Whatever the plans adopted, whatever the projects pursued, war of this kind would necessarily be carried on by the second line fleets; and indeed their duties would be of a scope for which previous experience affords no precedent. For we may re-set the strategical

* I suggest this as a mere strategical counter to the overrunning of Canada. The sentence must not be taken to imply that I am ignorant of the enormous difficulties which modern conditions of transport and supply oppose to such a project.

board in the Pacific as we choose; we may build up what military and political combinations we like, the general character of war in that theatre would always be the same.

"The Second Line Fleets."

How, then, do the results of the Washington Conference affect the position? In a highly important degree, for the essence of the agreement is that second line fleets will be almost eliminated, and that, in future, navies of great maritime states will consist only of first line squadrons and their complement of auxiliaries. The old class of battleship, upon which the expeditions to Quebec, to Havana, and the Dardanelles rested for their security, practically disappear. It must not be argued, from this, that it will no longer be possible to send out great overseas expeditions; but it does mean that as the methods for making them safe from interference, according to the old well-tried principles, disappear, so they will be more vulnerable to a sudden blow, and will, in consequence, be despatched more reluctantly. The outcome of the Conference is therefore of great importance to the future of the Pacific, not because it alters men's sentiments with regard to war, or introduces a new era into a world which shows no visible signs of change; but because it will make it extraordinarily difficult to conduct effectively war in that particular theatre. It is a great result, and one of which American statesmen may well be proud.

Recourse to Diplomacy.

Let us turn now to the diplomatic instrument which is designed to ensure peaceful relations between the Pacific Powers, and endeavour to examine the question which it raises: How far does this treaty relieve the burden of America's naval problem?

The question is not easy to answer as it involves a very intangible factor: the sentiments which govern international relations, and the extent to which those in power can direct and control those sentiments. None the less, the wording of the treaty * does throw some light on the question, and the first clause is extremely significant. It runs as follows: "The High Contracting Parties agree, as between themselves, to respect their rights in relation to their insular possessions and insular dominions in the region of the Pacific Ocean. If there should develop between any of the High Contracting Parties a controversy arising out of any Pacific question, and involving their said rights, which is not settled by diplomacy, and is likely to affect the harmonious accord now happily subsisting between them, they shall invite the other High Contracting Parties to a joint conference, to which the whole subject shall be referred for consideration and adjustment."

Words of this kind make one thing extremely clear: there is no outstanding cause of friction between the signatories. The words

* The treaty is reproduced *in extenso* in the Appendix.

"harmonious accord" sound rather strange, and would seem to refer more to music than to international relations; but their meaning is obvious. The compact solves no problem; it is designed to meet a contingency, not to settle a controversy. That contingency is expressed with more dignity, and is simply that one or other of the contracting parties might be tempted to violate its neighbour's rights over some insular possession or dominion.

Rights of the kind are either sovereign rights, inherent in every self-governing state, only to be violated by armed coercion, or rights acquired by negotiation and treaty. Obviously the compact does not refer to the first; for it is so unlikely that Great Britain, America, Japan, or France should violate their sovereign rights by a treacherous attack with no previous declaration of war, that no treaty would ever be necessary to provide against it. Indeed, if public morals made such a thing probable, a treaty would be worthless.

"Secondary Rights" and the Treaty.

The rights which may become a subject of dispute are, therefore, of the second kind. It is quite beyond the scope of this article to review the Treaty rights of Great Britain, of America, and of Japan in the Pacific basin; but it will not be irrelevant to outline the general lines of policy which animate the political life of each Power, for it is to regulate these policies, based on historical tradition and actuated by economic pressure, that the treaty has been framed.

The traditional policy of America has been one to which our own history offers no analogy. Theirs has no Cæsarean periods like those which have fashioned so many centuries of our own, and they share with the Chinese the honour of erecting higher monuments to their administrators than to their generals. Their constitution was designed to ensure each citizen the "pursuit of happiness," which was understood to be the same as the pursuit of wealth. Out of this frame of mind there has arisen a clear, consistent attitude in international affairs, which is this—the Government of the United States disassociates itself from its neighbours' concerns, *so long as the laws and government of all neighbouring states allow American commercial enterprise a free exercise for its energies.* The Spanish-American states may pass from one convulsion to another; so long as American capital in the country is not threatened, it is no concern of the United States; and provided American citizens are free, under the laws of the neighbouring country, to build railways, sink mines, and exploit oil wells, that country is free to regulate its affairs as it wishes. Its military weakness, however marked, will never put it in danger of American aggression. The foreign policy of the United States is therefore one of commercial penetration, without pressure, but with implicit guarantees against interference.

But commercial penetration may be of more than one kind; and it is precisely this which Japanese national policy has striven to effect, though in another form. America exports joint stock companies—Japan labour; and the two policies have come into

opposition. Asiatic labour is a commodity of immense value in industry, but the white races of the Pacific are determined to shut it out.

An Economic Problem.

Years ago, one of the most gifted men in Italy—Guglielmo Ferrero—visited the northern states of Europe, and set down his reflections in a book * of no ordinary interest and power. Of all the discussions which that work contains, the most penetrating and suggestive was one which centred round the question : What are the mental and moral qualities which most contribute to setting up a great industrial state ? His answer was, that those men who, by their habits of thought and life, could best tolerate the arduous, featureless labour of a modern factory: the turning of a handle at stated moments hour after hour, the moving of a plate, the washing of a stone, or the actuating of a wheel, were the best economic units which a state could possess. The qualities with which great captains of industry and finance are credited—far sightedness, ability to plan ahead, daring and enterprise—have been exaggerated by fancy and lack of understanding. When they do exist they probably exert far less influence on the industrial life of a state than has been imagined. Judged by this standard, the Asiatic labourer is more valuable to industry than any European; he is cheaper, more productive, and far more reliable. Those whose duty it was to supervise the Chinese labourers in northern France during the war, were much impressed by their output of work, and admit that it would be hopeless ever to expect a British labourer to work as hard, or to accept such wages. As a craftsman, for use in the upper stages of industry, the Asiatic is probably no bit inferior to the European. The instinct which prompted thousands of Asiatics to emigrate to great industrial states was, therefore, well judged; and the refusal of the great white states to allow them admission had in it little justice; although, as a means of avoiding internal troubles it may have been sound. It was simply a repetition of how Jews were treated in mediæval Europe. They were certain to win in fair competition; so they were handicapped by oppressive laws.

Commercial Penetration.

This, then, is the great question at issue in the Pacific. Two Powers desire to pursue a special form of commercial penetration; one side has been allowed it, to the other it has been refused. Can it be said that the Treaty which has just been signed mitigates the position, by giving a means of "talking out a dispute" ? Hardly; policies of the kind are too deeply rooted, and too persistently followed, to be altered by a diplomatic instrument.

But if the compact which was designed to avert conflict, seems almost powerless to affect the causes of quarrel, two considerations

* "L'Europa Giovane," by Guglielmo Ferrero.

may be advanced to show that the commercial policies of America and Japan may be prosecuted without leading to war; and that war in the Pacific, apart from the navies waging it, would so drain the resources of the two belligerents that neither ought to enter on it lightly.

Reference has already been made to the Dutch colonies; it may now be suggested that the eastern empire of the Netherlands may prove a means of reconciling the two policies which I have described.

The history of the native princes and kingdoms of the Dutch East Indies is difficult to trace, for it has only in part been recorded in written memorials. What we do know of it, however, emphasises the age-long connection between those native kingdoms and China. The nature of that connection was trade, as can be judged from the memorial presented to the Emperor of China in the year 977, by one of the native princes of Borneo. The message ran:

> The King of Puni, called Hianzta, prostrates himself before the most august Emperor, and hopes that he may live for a thousand years. I have sent envoys bearing tribute. Although I have known for long that there was an Emperor, I had no means of approaching his presence. But a *merchant called Pu Lu* came in a ship to the mouth of a river which flows through my kingdom, I received him with honour and he told me of the Emperor. My people rejoiced at his news, and prepared a ship and begged Pu Lu to guide them to your presence, that they might prostrate themselves at your feet. I have therefore sent envoys with them, and every year I shall send you tribute. My country has no articles but camphor, tortoiseshell, ivory, and sandal woods; and I pray that your Majesty may not be angry with me.

"The Dominant Power in the East."

This latter document, is what we should call a draft commercial treaty. The essential clauses are those which relate to the merchant Pu Lu, and the natural products of Borneo, and they suffice to prove the point which it is intended to advance: That from time immemorial the East Indian Archipelago has been a field for the trading enterprise of the dominant Power in the East. That trade has declined in value, because iron, coal, and oil are more important to a modern state than sandal wood and camphor; but it is still possible that these age-long relations may be revived and that Asiatic enterprise may exploit the wealth of Borneo, Java, and Sumatra without infringing the sovereign rights of the suzerain Power. Dutch colonial administration has been admirable; but the task of exploiting every source of natural wealth of her empire has hitherto been quite beyond the capacity of the mother country. Japanese and Chinese emigration, carefully fostered and controlled, might well be a first step towards drawing wealth from the East India Islands on a scale unheard of in economic history.

The extent to which modern warfare absorbs the industrial life of a state is, by now, an absolute commonplace; but as war is not a uniform thing, as the theatre in which it is waged determines the means employed, it will be instructive to examine how war in the Pacific would strain the resources of the Powers engaged. For this inquiry I assume that a state of war exists between America and Japan; as war between ourselves and America would be more an

Atlantic than a Pacific problem. Without entering into detailed forecasts of the plans which either side would adopt, we may further assume that, for the defence of the Philippines, the United States would be compelled to transport 150,000 men overseas. What would this entail? We must look back to obtain data for an answer.

THE TRANSPORT AND COALING PROBLEMS.

It is stated that when the American Expeditionary Force was being carried to Europe, it was found that every vessel engaged on the duty completed six round voyages of 7,000 miles every year; * that 2·1 tons of shipping were necessary for transporting every man, and that 1 ton per annum had to be allocated to the supplies necessary to maintain each soldier in the theatre of war. These figures require to be rather more closely examined before we can make deductions from them. The time expended on the six round voyages was made up of two parts: the time spent in port at either end and the time on passage. Given equal harbour facilities and equivalent conditions of weather on passage, we can therefore say that a vessel engaged in the duties of transport and army supplies will cover 3,500 miles per month, no matter whether she be plying in the Pacific or the Atlantic.

Now the distance from San Francisco to Manila is 6,220 miles, and from Panama to Manila 8,000 miles, making an average round trip of 14,000 miles between the western ports of America and the colony. Applying to these figures the average mileage capacity of a troop ship, we find that every vessel engaged on these duties will perform only three round trips per year.† That is, every soldier carried from America to Manila will require twice as much tonnage to take him there, and to maintain him when there, as was necessary for each American soldier in France. One hundred and fifty thousand men will thus absorb 630,000 tons of shipping at one draft, and after that 300,000 tons per annum for as long as the war lasts. This is easily within the capacity of the United States; but these high figures must be much increased.

Ships engaged in transporting the American troops to France could, at either end of the trip, fill up with coal brought by rail from the pitheads. This is not the case in the Pacific; as every block of coal to be stored at Manila for re-coaling the transport and supply ships will have to be carried across. We must, therefore, make a further examination to see what additional tonnage this will absorb.

The expeditions which we sent overseas during the war give us a fair measure: and on this new head I am told that the numbers of merchant vessels employed in military duties, and colliers necessary for maintaining them on those duties, were roughly equal; in other

* The distance from New York to St. Nazaire is 3,100 miles; and from Jacksonville to St. Nazaire is 3,700 miles. An average of 7,000 miles for the round trip from America to France is therefore reasonable.

† 14,000 ÷ 3,500 = 4, *i.e.* 4 months per round trip.

words, the figures which were arrived at by our first calculation must be doubled, and we arrive at the result that, before the United States can allocate a ship to an offensive plan, she will require 1,260,000 tons of shipping for transporting troops for the defence of the Philippines, and after that, 600,000 tons to keep them there, always supposing that 150,000 extra men would suffice, which is more than doubtful.

These figures are not, in themselves, prohibitive, as the United States possesses about 12,000,000 tons of shipping available for overseas service; * but it must not be forgotten that this calculation covers only one item in the war plan. In addition to defending the Philippines, the United States would be obliged to put considerable garrisons into Honolulu, which is distant 2,100 miles from San Francisco; and they would, in all probability, endeavour to hold Guam, which lies 5,400 miles from the mother country. Over and above all this, they would require a tremendous quantity of tonnage for an offensive effort against some of the Japanese possessions, the Marshall Islands, the Carolines, or possibly Formosa. All that can be said is that the country's resources could just stand the strain, though at a very great cost.

War and Economics.

There is no intention to repeat the calculation with regard to Japan. Her merchant navy totals about 3,300,000 tons, practically all of which is suitable for some kind of use in war, but this inferiority is very largely balanced by the shorter distances over which her fleets would operate: Manila is 1,300 miles from Nagasaki, and Kiirun Ko, the northern port in Formosa, is about half way between the two. As we have seen that the tonnage required for overseas expeditions is proportionate to the distance over which the expedition has to be transported, these figures show that the two opponents would be roughly equal in maritime resources. On the whole, however, there is reason to think that the balance of advantage would be with the Americans. Either opponent would be obliged to draw heavily upon its merchant shipping as soon as war began. This can only be done by cutting down imports and exports. The Americans can make enormous reductions in both; the Japanese cannot.

The Question of Armaments.

Attention may now be turned to the military effort necessary to secure these expeditions, and their flow of supplies. There can be no doubt that it will be enormous; and that the limited naval armaments foreshadowed by the Washington agreement will be strained to the utmost to provide it.

For the purpose of this discussion, it has been assumed that it

* The total tonnage of the U.S. merchant service is 17,000,000; of this 2¼ millions is engaged on the Lakes, and another 2¾ millions, about, is of a kind unsuitable for the service now under discussion.

will be vital to the United States to keep the sea route between the home country and Manila secure. Now, it is unlikely that the track between San Francisco and Honolulu will be seriously interfered with; but, after that, the position changes for the route runs right through a whole string of islands which have been ceded to Japan. First the Marshall Islands run at right angles to the main track; next the Carolines run parallel to it; and the two groups spread over a distance of 1,800 miles. They consist of atolls, lagoons, and semicircular reefs, which are very little known, and if the Japanese decide to make a careful hydrographic survey of the whole region, and keep the results secret, surface and submarine raiders will be able to operate from it with tremendous effect. It is little wonder, therefore, that the Americans have endeavoured to stop the building of fortifications upon the mandated islands; for a string of fortified harbours in the Marshalls and Carolines would practically isolate the Philippines from the mother country. As it is, it will mean that every ton of shipping for Manila will have to be under continuous and powerful convoy from Honolulu; and it is more than doubtful whether the fleet of light cruisers which America will maintain, under the Washington agreement, would suffice for a task of such magnitude. The British Navy, it is true, convoyed the whole of our trade during the last part of the war, but the two operations are not alike. Close convoy was only put into effect within the submarine area: outside that, diversions and forces of cruisers at the nodal points were enough. Even as it was, our vast naval resources barely sufficed, for a large part of the convoy work was done by vessels specially built during the war; and no navy, under the Washington agreement, will be even approximately equal to our own in 1918.

The Dilemma of the United States.

But as the duty will have to be performed; as the United States will have to maintain sea communication with her colony over a route which is vulnerable for 1,800 miles; and as her naval forces will be unequal to the whole task, what means will be found to solve the problem, if it should arise? There can only be one answer: merchant vessels will be armed more strongly than they have ever been before; and the distinction between the commercial and military arms of sea power grow fainter than ever. Doubtless international lawyers will discuss the new development at great length; but if international law and policy come into conflict, policy wins.

It has only been possible, within the space of this chapter, to indicate some of the political and military problems of the Pacific: to have examined them in detail would have filled a book. But if that examination is made, its general results cannot be doubtful. The war from which we have just emerged will offer little analogy to war between two Pacific Powers. The stupendous character of the recent struggle was due simply to the fact that the combatants were in physical contact with one another: their resources were thus carried straight to the fighting line by road and railway; with the result that every scientific device, and every ounce of natural wealth was

directly applied to the conflict, which took on an absolutely unlimited character.

The conditions in the Pacific are the reverse in every particular. Doubtless a struggle between two great Pacific Powers would dislocate the industries and engulf the wealth of either, but with far less military result. The conditions of the modern world are such that no reasonable student of war can see how millions of men could ever be brought into conflict in the Pacific basin; and no foreseeable improvement in weapons or means of transport will make such a result possible. If, then, a conflict should arise, it will more resemble the wars of the eighteenth than the twentieth century. Seeing how unsatisfactory the results are likely to be, and how much effort will be absorbed in producing the most insignificant results, the Powers concerned will probably be better served by a bad diplomatic bargain than a successful campaign.

ARCHIBALD COLBECK.

CHAPTER XI.

The Principles of Imperial Naval Defence.

"Although the principles of war are neither numerous nor in themselves abstruse, the application of them is difficult and will vary with the circumstances of each case. No two situations are identical, and therefore the application of the principles cannot be made subject to rules" (Field Service Regulations, Vol. II). So with the principles of Imperial Naval Defence. Political considerations, national characteristics—these have an influence on the application of the principles of war. The course of correct strategy may be deflected by the political object of the war; but at the same time the cardinal principles of war are only violated at peril.

It has been the unfortunate fate of all conferences on Imperial Defence that the statesmen attending should have had, probably unconsciously, one eye fixed on the political aspect of the question. This would perhaps not matter so much had the political aspect been that broad one which can never be entirely eliminated from a wide discussion of defence matters, but it was mainly that of the narrow sphere of party politics, and not always untempered by jealousy and a natural desire for the expression of local sentiment. Hitherto, therefore, the application of the true principles of Imperial Naval Defence have been deflected from their correct application by matters, no doubt important in themselves, which have been allowed to exercise undue influence not only during the discussions but also on the decisions reached on what is primarily a strategical question.

Partners of Empire.

In what follows, the attempt is made to discuss and formulate the principles which it is considered should guide the Empire in making arrangements for its adequate naval defence. Considerations of local politics will have no part in the discussion although it has been necessary to mention them. Local sentiment, however, must be taken into account. The Dominions proved their manhood during the war by the great contribution they made to the Allies' victory. They are partners in our great Empire, and partnership should mean, as in business, a seat on the board of directors; but is it too much to ask, when questions of purely local sentiment, if persisted upon, must inevitably act to the detriment of naval defence regarded as a whole, that they should be waived in favour of the greater sentiment "United we stand, divided we fall"? With these preliminary observations, which are necessary to clear the way, the discussion can now be proceeded with.

Integrity of Sea Routes.

Imperial Naval Defence should have as its prime object the securing of the integrity of the sea communications by which the Empire is bound together. This object can be achieved in war in two ways only: by defeating decisively the main naval forces of the enemy, or, if that is not possible owing to a persistent refusal on the part of the enemy to seek a decision by battle or for other reasons, by so disposing our main fleet that the enemy cannot move in force to interfere with our vessels controlling communications against sporadic attack without being brought to action by a superior force. Thus there are two different conditions which may be sought after: the first being what is generally described as command of the sea; the second which is best defined as control of communications. The first, or greater condition, of course, would include the second or smaller. In other words, the first is an absolute achievement, while, in the case of the second, the ultimate issue remains in suspense.

The first or absolute condition of the security of sea communications cannot, therefore, be attained without fighting for it. Battle in the principal theatre of war thus becomes the main end for which preparation must be made, and the first great principle of war has direct application to the principles of Imperial Naval Defence. "In every war," to quote from the Field Service Regulations, "an objective is essential; without it there can be no definite plan or co-ordination of effort. The ultimate military objective in war is the destruction of the enemy's main forces in battle, and this objective must always be held in view." It is the same with Imperial Naval Defence. Mark carefully the words "without it there can be no definite plan or co-ordination of effort."

Apart from the political influences which have, from the very first, undermined the foundation on which our patchwork system of Imperial Naval Defence has been built, it came about that the foundations were incorrectly laid. Naval Defence came to be first seriously considered, and the first Colonial Conference was held, during a period when our naval doctrine was all awry. Those were the days of invasion scares, and of the ascendency of a school which worshipped at the shrine of brick and mortar coast defences, and coast defence vessels which could neither fight nor run away. Indeed, the axiom that the best defence consists in hitting your enemy hard and keeping on hitting him was unknown to that school who thought in terms of local coastal waters and ignored the great sea arteries of Empire. What blame therefore to the Colonies who, endeavouring to take some share in naval defence—it could not by the widest stretch of imagination be called Imperial Naval Defence,—sat down under these pundits and imbibed the pernicious doctrine of local coast defences and the abnegation of naval warfare generally.

Doctrine of Coast Defence.

From the first, the late Sir John Colomb, aided by his brother, the late Admiral Colomb, endeavoured to guide the discussions into

their true sphere. The history of Sir John Colomb's efforts to secure a reasonable scheme of Imperial Naval Defence is related by Sir Howard D'Egville in his book, "Imperial Defence and Closer Union," which, published in the year preceding the war, is well worth the attention of students of the subject if read in conjunction with the lessons of the Great War. Sir John fought tooth and nail against the doctrine of coast defence and local navies, and to a certain extent was able to influence opinion, although the pure principles advocated by him were subjected to compromise before official adoption—to compromise—the bane of the British character!

The Admiralty, in pre-war days, also had a conception of the correct principles which should govern Colonial (now Dominion) participation in Naval Defence; but as far as can be ascertained, they contented themselves with enumerating the cardinal principle somewhat half-heartedly and unaccompanied by any reasoned argument for its adoption. The principle was best expressed at the Imperial Conference of 1909 in the following words: "The greatest output of strength for a given expenditure is obtained by the maintenance of a single Navy with concomitant unity of training and unity of command;" to which a rider was added: "The maximum power would be gained if all parts of the Empire contributed to the sources of the British Navy." As far as it goes this is an obvious truism, but to carry conviction it is necessary to examine its application or neglect in the light of the principles of war.

That the Dominion representatives as a whole were not convinced by any arguments in support of this principle, which was adduced by the Admiralty, is sufficiently obvious, although conceivably the effort of keeping one eye on local politics distorted their vision. New Zealand alone declared boldly in favour of the Admiralty principle; Australia and Canada were determined on local navies—merely a growth of local coast defence in the case of the former—while South Africa, being on the eve of the Union, withheld judgment but maintained her small contribution to the Imperial Navy.

Violation of Principles of War.

It so fell out that although the decision of Australia and Canada undoubtedly violated the first principle of war, the international situation which existed during the decade preceding the outbreak of the Great War did not make this violation apparent, neither did the violation affect adversely the conduct of the war as a whole.

The reason was this: The obvious enemy lay nearer to the heart of the British Empire than to any of the members. The concentration of the forces of this potential enemy was met by a counter-concentration of the British Fleet in Home waters. Great Britain's geographical advantage was very great, and judiciously used in conjunction with the main fleet, ensured that the control of distant sea-communications should not be seriously disputed. Nevertheless, it is apparent to all students of the war that had there been a truly unified Far Eastern Fleet in being in August, 1914, the account with von Spee would probably have been settled before he could have left

the Western Pacific. There would have been no battle of Coronel, and the security of communications in those regions would have been placed beyond a peradventure.

It is true that although Australia possessed a navy of her own, it passed under Admiralty control on the outbreak of war; but there is ample evidence that the essential objective of all the British forces in far Eastern waters, *i.e.* the destruction in battle of von Spee's squadron, had not been adopted as the guiding principle. Consequently there was neither definite plan nor co-ordination of effort, and there was a marked tendency to bring pressure on the Australian Fleet to play a coast defence rôle.

Canada's naval forces, on the other hand, were hardly worth consideration at the outbreak of the war—one small cruiser on the Pacific coast! Yet, as a sop to sentiment, this was recognised as the Royal Canadian Navy, and the forces of the British Navy in the Pacific were consequently reduced.

Changed Conditions.

Yet, withal, this double violation of the principles of war—for the principle of concentration in the Pacific was also violated—affecting as it did only a minor theatre of the war, had but a temporary effect on the main theatre. It necessitated the detachment of a battle-cruiser from the Grand Fleet at a critical juncture, with the addition of a battle-cruiser from the Mediterranean, to deal with von Spee off the Falklands.

But now, in 1922, all is changed except the everlasting fact that the continuance of the British Empire depends primarily on secure sea-communication. It is no longer possible to point to any one Power as the probable enemy, and Great Britain no longer holds the great advantage of geographical position in relation to any possible enemy of naval magnitude. The difficulty of the problem of Naval Defence is increased enormously. True there is a Naval Treaty on the point of ratification, which limits in certain directions the naval strength of the principal Powers; but from a purely strategical point of view, this further complicates our problem, which can no longer be solved by a home concentration which covers the heart of the Empire, and by a disposition which, while denying to the enemy the use of his distant sea-communications, ensures the control of our own. Where, in 1914, we thought in tens of miles, to-day we have to reckon in thousands. The next war may not be fought in defence of the heart, but for the saving of one of the limbs which, if cut off from the main body for a calculable period, would surely wither and die.

Any attempt to be strong everywhere inevitably results in general weakness. Concentration of force in the decisive theatre is a proved principle of war. But what if the decisive theatre of the future cannot be accurately foretold? All that can be done is to prepare the way for a concentration in any theatre where there is even a remote possibility of an issue being raised which would strike at the security of any portion of the British Empire. Nor is there

anything provocative in such action. We must visualise and prepare for possible concentrations of our main forces in localities separated by ten thousand miles of sea route. To transplant a large fleet to such a great distance is not the work of a moment. In order that it should proceed to the vital theatre as rapidly as possible in sudden emergency it is necessary that it should be able to move with the least possible encumbrances. Its impedimenta must be reduced to a minimum consistent with its security whilst on passage, and its mobility must be secured by the provision of ample and safe replenishing stations *en route*. On the conclusion of its voyage, it must find an adequate base provided with all essentials for refitting, together with an advanced base for operational purposes. Otherwise it would be a repetition of the unhappy story of Roshdeventsky.

So we arrive at another principle of war applicable to Imperial Naval Defence—mobility. Mobility, moreover, is the chief means of inflicting surprise, one of the most effective and powerful weapons in war. On the other hand, the maximum of mobility in the case of the main striking force will be of no avail, if it arrives in the decisive theatre only to find that the enemy has established a working control over the communications necessary for the carrying into execution of his object, whether that be invasion or any other activity by which war may be brought to a successful issue. Such was the fate of Roshdeventsky's fleet. True, that its mobility was practically at a minimum, and that he made no use of the element of surprise and did not act in a manner calculated to mystify and mislead the enemy. A superior fleet occupied the line of communication to his only base, and he was called upon to fight with every disadvantage on his side. The lesson of Roshdeventsky is one that it is necessary should be taken to heart by the Dominions.

A Fleet in Being.

How, then, can such a possibility be obviated in any scheme of Imperial Naval Defence? There appears to be no other method than a modern adaptation of the doctrine of a "Fleet in being." This doctrine has been well defined as "a Fleet strategically at large, not itself in command of the sea, but strong enough to deny that command to its adversary by strategic and tactical dispositions *adapted to the circumstances of the case*." So defined it is the very antithesis of purely local defence, and in the circumstances under discussion it would suffice if it had the effect of denying to the enemy that sense of relative security which is necessary before he can establish himself permanently in the area of approach of our main striking force, which may be expected to arrive upon the scene within a reasonable period; besides rendering it hazardous to a degree for the enemy to attempt any major operation for the purpose of bringing the war to a successful issue; as, for instance, invasion. Again, it is seen the matter pivots on the question of communitions.

Having outlined briefly the abstract strategic situation with

which we are confronted to-day, it is possible to examine it in the concrete. At the present moment, outside Home waters, there are lacking many of the conditions vital to the maximum mobility of our main fleet, or striking force. The range within which it could deliver those swift smashing blows which are essential to victory is consequently small in comparison with the range of its possible employment, which it is now necessary to visualise. This is serious enough in itself, and undoubtedly constitutes one of the grave risks which the Board of Admiralty have publicly stated that they are taking. Lacking the necessary full facilities for replenishing fuel supplies *en route*, with no first-class dockyard with adequate docking capacity available at the journey's end, with no reserve ammunition outfits ready on the spot, everything down to floating docks would have to accompany the armada, whose rate of progress would be so slow that the issue would probably be decided before its arrival; which almost certainly would be heralded by a battle in which the enemy would fight with every advantage on his side. A lost battle under such circumstances inevitably would mean the end of the British Empire as far as that quarter of the globe was concerned.

Useless Type of Navy.

Of what use would be the type of Dominion Navy which is now in existence? It could do no more than shelter in harbour until forced by external pressure to surrender. Such a rôle is the direct opposite to that of a "Fleet in being," of which the first postulate is that it should be strategically at large. However much it were animated by a doctrine common to that held by the British Navy, or conducted on identical principles of staff work or command, it would still be impotent. Situated in the main theatre of operations, a small unsupported fleet of the present Australian type, which is only thrown into the common pot in the event of war, would become merely a source of weakness. Again, it is a violation of the principle of concentration and a sacrifice on the altar of sentiment.

But modern naval developments have made a true rendering of a "Fleet in being" doctrine possible on a relatively economical scale. Submarines and aircraft, by the power which the first possess of moving on and beneath the sea, and the second of moving in three dimensions, are able to maintain themselves strategically at large under conditions in which a weak surface fleet would be shut up in harbour or speedily wiped out. On the other hand, they cannot of themselves gain and hold control of communications, although for a time, until the enemy has developed his full counter-measures, they can, by rendering his communications insecure, prevent him from embarking on any major operations which have as their object the conquest and holding of territory. They thus afford time for the arrival of the main striking force from a distance, besides ensuring the security of the base or bases on which the main force will have to depend for its future operations. It is necessary to add that this end will not be achieved by tying the modern "Fleet in being" down to a mere coastal defence. It must be actually "strategically

at large," and in the case of the submarines the area and range of their operations should be such as to preclude the enemy from occupying an advanced base as a stepping-stone to further operations or in furtherance of his anti-submarine measures.

Summary of Conclusions.

It is now possible to summarise the conclusions reached and from them to formulate the principles which it is considered should govern the question of Imperial Naval Defence. We find first that the strategical situation has changed radically, to an extent which has rendered the maintenance by Dominions of small fleets of surface vessels a dangerous violation of the principles of war; this being brought about by the possibility of circumstances suddenly arising to give cause to a war in which one or more of the Dominions may be situated in the decisive theatre. A further new factor introduced by the altered conditions is the necessity of considering the transferring, possibly at short notice, of our main fleet to waters far distant from the Home Country; this is complicated by there being no certainty that gathering clouds would long foretell the coming storm.

Despite the change in the conditions governing our naval position, the safety of the Empire still depends primarily on secure sea-communications, which in war cannot be rendered permanently so except by the defeat of the enemy's fleet. Local forces devoted to purely local uses cannot attain this end, which is the province of a striking force with one objective—the enemy's fleet. Deflection of forces for any other purpose save for the control of other essential communications which might otherwise be in jeopardy—of course leaving out vessels employed on purely auxiliary work, such as minesweeping and local patrol for anti-submarine and other duties—is a violation of the great principle of concentration at the decisive point. Finally, all will depend, in the case of a threat to a distant Dominion, on the main striking force arriving in time and on its possessing the necessary freedom of action on arrival. This in its turn is dependent on mobility, which includes the provision of fuelling and other facilities on the route which it would have to follow, together with secure bases with ample facilities for docking, repairs and replenishment in the theatre of operations; the whole turning on the successful action in the meantime and complete strategical freedom of the "Fleet in being" already on the spot, the constituents of which have been outlined.

From the above conclusions the principles of Imperial Naval Defence applicable to the existing situation may now be adduced. They are considered to be:—

(*a*) The maintenance of a highly efficient Central Striking Force in all its component parts, including aircraft, and of maximum mobility, ready to proceed to the decisive theatre of war at the shortest possible notice in order to give battle to, or to contain, the enemy's main fleet.

(*b*) The maintenance, in localities which are at all likely to become the decisive theatre in the event of war, of all the means necessary for the full support of the Central Striking Force on its arrival, in a condition of fighting efficiency over a prolonged period. This includes arrangements for the provision of as large a proportion as possible of the non-fighting auxiliaries which are necessary to attend on the Central Striking Force; the storage and upkeep of a proportion of supplies of all descriptions and arrangements for their regular replenishment in the event of war; and the establishment of dockyards and bases with adequate organisation for rapid expansion in case of emergency.

(*c*) The maintenance in regions to which, at any time, it may be necessary for the Central Striking Force to proceed in order to exercise the functions defined in (*a*), of the modern form of a "Fleet in being," as outlined earlier in the chapter, for the purpose of disputing the control by the enemy of vital sea-communications for the period which would elapse between a sudden declaration of war and the arrival on the scene of the Central Striking Force. In addition, an efficient Air Service, containing all the elements necessary for full co-operation with the Central Striking Force after its arrival and during its approach.

(*d*) The maintenance of the necessary forces, cruisers and light craft, for the control of communications between the component parts of the Empire, together with the establishment of adequate and safe refuelling points for their use and for the use of the Central Striking Force when on passage.

An Imperial Fleet.

In applying the above principles opportunity would be afforded to every Dominion (and India) of taking a part which should allow their natural characteristics and sentiments full expression. Although the type of Fleet which would result from the adoption of these principles would be of an Imperial character, in which purely local navies would have no part, and with its dispositions subject to the vagaries of the international barometer, there is no reason why ships provided and manned by the Dominions should not either form part of the Central Striking Force, of the forces for the protection of the trade routes, or alternatively why a Dominion should not provide its own "Fleet in being;" the latter, however, as an integral part of the Imperial Navy. Similarly, in the raising and training locally of personnel to perform the functions which are necessary in modern warfare to the freedom of movement of vessels of war and commerce in coastal waters, the Dominions (and India) would be directly represented in the edifice of Imperial Naval Defence.

The question of contribution towards the cost of the upkeep of an Imperial Navy and all its accessories has formed no part of this discussion. It must suffice to say that whether contributions be in men, money, or ships, they should be on a proportional basis. Viscount

Jellicoe, in his admirable report on his naval mission to the Dominions and India, has laid down clear principles as to how a just proportion can be arrived at, which only requires adjustment to the changed conditions brought about by the Washington Conference in order to serve as a basis.

Finally, an Imperial Fleet, to which all portions of the Empire contribute in one way or another, would necessarily imply that the partners should have a say in its control in proportion—to use a business expression—to the number of shares they hold, without, of course, infringing the principle of unity of command. This, too, becomes, therefore, a principle of Imperial Naval Defence, but space does not permit of its elaboration.

The main essential is the assembling, at the earliest possible moment, of an Imperial Conference on Defence matters, to which it is eminently necessary that the members should come with open minds stripped of all previously held tenets. It is no use tinkering with old foundations. The boldest measures are invariably the safest. The existing ramshackle edifice must be pulled down and a solid building raised in its place. Firmly erected and cemented with good-will, it would prove a determining factor towards a lasting peace. This should be the spirit animating the next conference.

United we stand, divided we fall—and the principle of local navies, which cannot, by their very constitution, reach that state of efficiency which is more than ever necessary in these days of financial stringency, means division in addition to being a violation of the principle of economy of force. This in its turn involves the correct distribution and employment of all resources in order to develop the maximum striking power.

H. Rundle.

CHAPTER XII.

The Royal Corps of Naval Constructors.

It would no doubt be a most interesting task to trace from the earliest days the history of the building and fitting out of ships of war in this country, and of the men who carried out this work from time to time. This matter has, however, been dealt with in other histories, and to follow it up from the beginning would take up far too much room in the "Annual." However, properly to appreciate the work which has been done for the Navy by the Royal Corps during the last fifty years, it is important to give a short *résumé* of what took place for some time before the founding of the Corps.

Early Naval Armament.

Up to the middle of the fifteenth century there was little difference, either in size or arrangement, between warships and merchantmen. The former were few in number, and between 1260 and 1445 most of the naval duties of the Kingdom were carried out by the Fleet of the Cinque Ports. Guns, introduced on shipboard in the fourteenth century, were fitted on both types of vessels, the merchantmen requiring them for protection against the numerous pirates that infested the seas. The number of guns mounted on merchantmen was fewer than in warships, but in time of war, by adding castles at the bow and stern, an increased number could be carried in the former. Guns, generally, were of small size, the majority being of a type termed serpentines, which fired an iron shot of about 4 to 6 lbs. weight. In addition, there were a few guns of a larger calibre which fired stone shot. All guns were mounted on the upper works, *i.e.* upper deck, forecastle, poop, and in the mast tops.

The number of guns mounted in warships gradually increased as the fifteenth century progressed, and the Regent, built in 1498, is said to have carried about 180, mostly of the serpentine type. This gradual increase in the number of guns necessitated a correspondingly larger ship and bigger complement, and the dimensions of warships increased as compared with those of the largest merchantmen.

Developments in Warship Design.

Important developments took place in warship design in the early part of the sixteenth century which still more strongly differentiated the warship from the merchantman. Gun ports

between decks were introduced by a shipbuilder of Brest in 1501, and were soon copied by other nations. Larger guns, termed curtows, firing a shot of about 34 lbs., had been successfully made on the Continent and were available for mounting on ships. These two developments led to the introduction of a type of warship mounting a numerous and heavy broadside armament, a type which remained until the middle of the nineteenth century. Henry Grace-de-Dieu, or the Great Harry, built 1512-15 by Henry VIII. to replace the Regent, lost in a naval action with the French off Brest, was the first "great" English warship. She was of a tonnage of 1000 and mounted nearly 200 guns. The Mary Rose and Peter Pomegranate, built early in Henry's reign, had tonnages of 500 and 450, as compared with the largest merchant ship of 150 tons.

These developments in the size and armament of warships gradually reduced the use of merchant ships for fighting purposes. They were now of too small a size to stand up against the much larger warships, and their efficient conversion became a much more difficult matter than previously. Nations with maritime interests to protect were thus forced to build ships for this special purpose. Warship design and construction thus became a specialised branch of Naval Architecture necessitating a trained body of Naval Architects and also the provision of dockyards in which the ships could be built, rebuilt, docked, repaired, and refitted.

Henry VIII. succeeded to the throne shortly after these developments had taken place and had the insight to appreciate their effects and also saw that the safety of his Island Kingdom depended on the possession of a strong Fleet. He proceeded to purchase and build ships to form this Fleet, founded and developed the Dockyards, and formed an Administration to deal with Naval Affairs. At his accession, only one naval official besides the Lord Admiral was in existence. He was the Clerk of the King's Ships, an office founded as far back as 1212. At Henry's death in 1547 there were seven officials whose successors may be traced down to the present day. These were Lieutenant of Admiralty, Treasurer, Comptroller, Master of Ordnance, Surveyor, Clerk of Ships, Clerk of Stores. The First Surveyor of Ships and Rigging, whose duties are now carried out by the Director of Naval Construction, was appointed in 1544.

The Master Shipwrights.

Five shipwright officers were awarded pensions by Henry VIII. for their services in building his ships. The two most famous of these were James Baker and Peter Pett. The former was responsible for the arrangements by which heavy guns were successfully mounted on warships. He was the father of Matthew Baker, the first officially appointed Master Shipwright. Peter Pett was the first of a famous family of shipbuilders who for a century and a half were the principal designers and builders of English warships.

The loss of Calais in 1558 threw upon the English Navy, more than ever, the duty of defending the Island Kingdom and led to the

issue by Elizabeth in 1560, of ordinances and decrees for the regulation of naval affairs, in which the Navy is alluded to as the Chief Defence of the Realm. Queen Elizabeth followed in her father's footsteps so far as naval matters were concerned; but she tightened the connection between the Royal Navy and the designers and builders of its units by appointing Matthew Baker (1572), Peter Pett (1582), and Richard Chapman (1587), as Master Shipwrights of the Navy. Each had two Assistants, and this body of nine officers were the predecessors of the Royal Corps of Naval Constructors. Two Master Shipwrights and their Assistants were stationed at Chatham Yard and the third was in charge of Deptford and Woolwich. Portsmouth Yard was the chief victualling port and rendezvous in time of war, but little building or repair work was carried out there. If any had to be done, a Master from Chatham went to superintend it.

As the Navy increased in strength and numbers, it became necessary to increase the number of Dockyards and also the Master Shipwrights and their assistants. At the beginning of the seventeenth century there were three Master Shipwrights, at the end there were seven, viz. one each at Woolwich, Deptford, Chatham, Sheerness, Portsmouth, Devonport, and Kinsale. In 1629 two of the Master Shipwrights were appointed Assistants to the Navy Officers or Navy Board, and in 1630, the two, William Burrell and Phineas Pett, were made Commissioners of the Navy. Up to the end of the century there was usually one, and sometimes two, Naval Commissioners who had previously been Master Shipwrights.

The line of Master Shipwrights can be traced down through the centuries from Elizabeth's time. The title disappeared in 1873, when it was changed to that of Chief Constructor, and at the same time the Chief Constructor of the Navy became the Director of Naval Construction, the first holder being Sir Nathaniel Barnaby. He had succeeded to the office formerly known as Surveyor of Ships and Rigging, founded in 1644. In 1660 the office of Surveyor of Ships and Rigging, which had previously been held generally by a naval officer, was filled by Sir John Tippetts, who had been Master Shipwright at Portsmouth and afterwards Naval Commissioner there. This was the first instance of a Master Shipwright being appointed to the Navy Board. From 1660 on to 1837 the office of Surveyor was held by one, and sometimes two, Master Shipwrights.

Generally the Master Shipwrights and their assistants had been trained in the Government Service, the Masters having the privilege of taking premium apprentices chosen from the best youths of the Dockyard towns and who were afterwards appointed as Assistants. There are, however, several instances of private shipbuilders being appointed Master Shipwrights, two of the most famous being William Burrell, 1618–30, and Captain John Taylor, 1650–1660. Many of the Master Shipwrights possessed private yards in which they built merchantmen; but a report by John Holland in 1652, in which he pointed out the grave disadvantages attendant on a Master Shipwright carrying on a private shipbuilding concern whilst holding a Government office, led to a regulation being enacted restricting the Master Shipwright's activities to his Dockyard duties.

Early Methods of Design.

In those days design of ships was a crude process. No theoretical principles were known and design was necessarily developed by a process of trial and error in which the designer with the most extended experience was likely to meet with the greatest success. The provision of sufficient stability was one of the most difficult problems of the time, and as top-weights were continually increasing in the form of heavier armament, new ships were generally found lacking in stability and had to be improved by fitting girdlings or adding ballast.

A notable step, so far as design was concerned, was made by Sir Anthony Deane, who devised rules by which the displacement of a ship could be determined from the drawings when the draughts were known ; Pepys refers to this in his Diary in 1666. By these rules, the weight of hull of various classes was determined by taking the draughts when launched, and the weight of equipment by observing the draughts when completed. This procedure was ordered to be adopted in 1684 by Sir Richard Haddock, then Controller.

About this time also, the first establishment of dimensions of various classes of warships was promulgated, and this was followed by others in 1690, 1704, 1719, and 1745. Commissions settled these dimensions on proposals from the various Master Shipwrights and comparison with those of foreign warships. To these established dimensions the English warships were built.

The qualities of the British warships during the eighteenth century were generally admitted to be inferior to those of the French and Spanish. There was no outstanding genius amongst the Master Shipwrights in any way comparable with Phineas Pett and Anthony Deane in the seventeenth century. The French Government encouraged the study of the theoretical principles of Naval Architecture, and offered prizes which were competed for by the most prominent scientists of the Continent. Improvement in the qualities of French warships resulted.

Unfortunately, the English scientists took no interest in the matter, and as the shipbuilders did not possess the mathematical knowledge to follow the French scientists, they had to take the only other step which was possible for them and frequently copied the lines and arrangements of any French warship which was captured. Although lacking in the scientific attainments of the French, the British shipbuilders were acknowledged to be far more skilful in the art of construction than their continental rivals.

The Society for the Improvement of Naval Architecture was formed in 1791 by a few public-spirited men, who were alarmed at the reports as to the lack of essential qualities in our warships and their inferiority compared with those of our rivals. The society was composed of many naval officers and a few scientists and public men, but the shipbuilders held aloof. Very little was done by the society in the direction desired, except to inform public opinion of the desirability of founding a school in which the theoretical principles

underlying the design of warships could be studied by those engaged on constructing the nation's first line of defence.

Schools of Naval Architecture.

Lord Barham, who as Sir Charles Middleton had been Controller of the Navy and a Vice-President of the society already mentioned, presided over a Commission, which in 1806 inquired into the Civil Affairs of the Navy. This Commission recommended the formation of a School of Naval Architecture for the training of Naval Constructors. This the Government adopted, and in 1810 the school was opened under the direction of Dr. Inman at Portsmouth.

This school continued until 1832, and amongst its most famous students were Reade, Chatfield, Creuze, and Morgan. All entered the Government Service, and the three first named presented to the Admiralty a voluminous report on Naval Construction in 1845, whilst Morgan and Creuze edited those classical "Papers on Naval Architecture," in which the theoretical principles of Naval Architecture, as elucidated at the time, were very clearly set forth, a tribute both to the literary and technical ability of the former students of the school. Augustin Creuze was afterwards Chief Surveyor of Lloyd's Registry.

In 1832 the post of Surveyor of the Navy, which for more than a century and a half had been held by technical officers, was filled by the appointment of Captain—afterwards Admiral Sir William—Symonds, a naval officer who appears to have had a marked contempt for those who considered that scientific principles could be utilised in the design and construction of warships. At the time, the First Lord of the Admiralty was Sir James Graham, whose views coincided with those of the Surveyor he had appointed. To the two was due the closing of the school.

It was opened again, under Dr. Woolley in 1848, on the retirement of Admiral Symonds, but on a somewhat different footing from the first school. The Dockyard schools for the instruction of apprentices had been started in 1843–4, and the second school was for the higher training of those who, by their ability in the Dockyard schools, had shown themselves worthy of a more advanced course of studies. Sir James Graham closed the second school in 1853. Amongst its most famous students were Sir Edward Reed, Sir Nathaniel Barnaby, and Messrs. Barnes and Morgan, all of whom afterwards became prominent Naval Architects.

The South Kensington and Greenwich Schools.

In 1860 the Institution of Naval Architects was formed, and the Council at once proceeded to advocate the re-opening of the School of Naval Architecture. The most prominent naval architects of the country were associated in this movement, and in 1864, as a result of their efforts, the third School of Naval Architecture was started as a part of the Science and Art Department at South Kensington. But it differed in some important respects from the

first and second schools. Naval engineering had developed, and it had become necessary to provide for the higher training of those apprentices who had shown marked ability in the Dockyard school. The third school was, therefore, arranged for a higher course in Naval Engineering, as well as in Naval Architecture. In addition, private students, both British and foreign, were entered and passed through the course in the same way as the Government students. Many of the foreign students afterwards filled prominent positions in their own countries, and, with the exception of the French Navy, the majority of the ships of foreign navies were built by the past students of the school. France, always in the forefront of scientific progress, had for years its own school in Paris. In later years other countries have instituted schools for a similar purpose, but the courses in these are generally based on that of the Kensington School. In 1873 the school was removed to the Royal Naval College at Greenwich, where it has since remained. Amongst the most brilliant scholars of the Kensington School were Sir William White, Sir Philip Watts, and Dr. Elgar.

The Government students, after passing out of Kensington, were at first given positions as supernumerary draughtsmen at the Dockyards, receiving 6*s.* to 7*s.* a day. For higher positions they had to compete with the draughtsmen and leading men, and were given no advantages in these examinations, except such as their higher training allowed them. Many of them became foremen, and afterwards filled the higher positions in the Yard and at the Admiralty. There was great dissatisfaction with this method of procedure, for the students felt that having undergone the higher training, and passing many examinations in which their knowledge had been tested and found satisfactory, they should be assured of positions corresponding to their attainments. Many left to fill positions in private shipyards, and of 28 who had passed through the school and obtained the necessary qualifying certificates, only 16 entered the Service.

Formation of the Royal Corps.

Representations on this matter were made to the Controller of the Navy, who had a memorandum prepared as to proposals for altering the procedure, and these were considered by a Committee presided over by Sir Thos. Brassey,* appointed in June, 1882. The other members of the Committee were Mr. G. W. Rendel, Admiral Sir G. T. Phipps-Hornby, and Mr. (afterwards Sir Nathaniel) Barnaby. This Committee was appointed to consider the existing regulations for entering, training, and promoting workmen and apprentices in H.M. Dockyards, and to make suggestions, if considered necessary, for their improvement. They recommended the formation of the Royal Corps of Naval Constructors, determined its numbers, its ranks, training, promotion, and pay, and the manner of their recruitment. In addition, they dealt with the similar questions of the Engineering Department of the Navy.

* Afterwards Earl Brassey, the founder of "The Annual."

As a result of the Brassey Committee, the following Order-in-Council was promulgated, under date 23/8/1883:—

"Whereas we have had under our consideration the position of the Civil Officers charged with the Shipbuilding duties in the Department of the Controller of the Navy and in Your Majesty's Dockyards, and whereas we are humbly of opinion that it would be for the advantage of the Service that the said officers should be constituted into a Corps to be called the Royal Corps of Naval Constructors, Your Majesty having been graciously pleased to approve of the said Corps being designated Royal,

"We recommend that Your Majesty will by your Order-in-Council approve of the Corps being constituted under such Rules and Regulations, as regards Titles, Numbers, and Salaries as we may from time to time determine with the concurrence of the Lords Commissioners of Your Majesty's Treasury."

Constitution of the Corps.

At its formation, the Royal Corps consisted of 1 Director of Naval Construction, 8 Chief Constructors—2 at the Admiralty (1 being Surveyor of Dockyards) and 6 at the Dockyards; 11 Constructors, 3 being at the Admiralty; 10 Assistant Constructors First Class, 9 being at the Admiralty and 1 at the Experiment Tank, Torquay, with Mr. W. Froude; 18 Assistant Constructors Second Class, 5 being at the Admiralty and the remainder at the Dockyards; and 11 Assistant Constructors Third Class, all at the Dockyards, except 1 who was at Torquay. The total number was thus 59.

The Brassey Committee in recommending the numbers and constitution of the Corps appear to have followed, in the main, the recommendations of the memorandum of Admiral Sir Houston Stewart, the then Controller, and there is little doubt this was prepared by Mr.—afterwards Sir William—White. This memorandum states that the constitution of the French Génie Maritime was generally followed, but with two very important exceptions. The members of the Génie Maritime were both Naval Constructors and Naval Engineers, whereas the Royal Corps was composed of Naval Constructors. The other exception was that, whereas the members of the Génie Maritime were chosen from the most promising of the higher students of the Polytechnic at about the age of 20 or 21, these had no practical knowledge of shipbuilding or engineering, and had to make themselves acquainted with it after two years' further study, *i.e.* after the age of 22 or 23. The members of the Royal Corps of Naval Constructors, on the other hand, were to be trained from the time at which they entered H.M. Service, *i.e.* from the age of 14 or 15.

Entrance to the Corps.

The Committee also recommended that the recruiting ground of the Corps should be extended. The first on the list of the successful candidates for the position of Engineer Student in the Navy were to be offered the choice of becoming Naval Constructors. This was adopted in 1884, when three of the first candidates on the list chose

to become Constructors. This has been followed in later years, although generally the numbers have been limited to one or two in each entry, and the choice has been made after two or three years' service as Engineer Students, instead of on entry. Twenty-four have transferred in this way.

It was also recommended that a limited number of candidates below 25 years of age, not trained in the Admiralty Service, should be allowed to sit in the final examination at Greenwich and be taken into the Corps, if they passed successfully. In this way some 20 members of the Corps have been entered, but in all cases they were students at the Royal Naval College before they sat for the examination. A further number was selected from the Foremen of the Yard under 50 years of age, who had to pass a technical examination in order to qualify for entry. Between 1887 and 1901 fourteen Foremen of the Yard were entered into the Corps.

Other Committees have, from time to time, considered the constitution, numbers, and emoluments of the Royal Corps. A Committee, presided over by Sir Charles Fane, sat in 1901, and another, whose Chairman was Lord Inchcape, in 1910–11. These have made recommendations as to pay and emoluments, but at the present moment these compare very unfavourably with those of other similar, but not so highly trained, bodies of officers in the Government service. Whereas other bodies have had very substantial increases, especially during and since the war, the established pay of the Royal Corps has remained at the pre-war level. The Inchcape Committee recommended the grading of Assistant Constructors into two classes, instead of three, and also that Foremen of the Yard should no longer be entered into the Corps.

The present approved Establishment of the Royal Corps of Naval Constructors, totalling in all 122, is as follows:—

1 Director of Naval Construction.
1 „ Dockyards (not a member of the Corps).
1 Deputy Director of Naval Construction and Director of Warship Production.
1 Deputy Director of Dockyards.
3 Assistant Directors of Naval Construction.
4 Constructive Managers at Portsmouth, Chatham, Devonport, and Rosyth.
15 Chief Constructors, 9 at Admiralty, 5 at Dockyards, and 1 overseeing.
7 Senior Constructors, 2 at Admiralty, 4 at Dockyards, and 1 overseeing.
40 Constructors, 20 at Admiralty, 19 at Dockyards, and 1 overseeing.
32 Assistant Constructors, 1st Class: 23 at Admiralty, 2 overseeing, and 7 at Dockyards.
17 Assistant Constructors, 2nd Class: 2 at Admiralty, 1 at Haslar, 9 at Dockyards, and 5 at sea.

These numbers are at present under revision, and one post, that of Director of Dockyards, is not held by a member of the Royal Corps, but by a naval officer.

TABLE I.—NUMBERS OF H.M. SHIPS AT THE OUTBREAK OF WAR AND AT DATE OF THE ARMISTICE.

(Ships in the Naval Service of Dominion Governments are included.)

Description.	August 4, 1914.		November 11, 1918.	
	No.	Displacement Tonnage.	No.	Displacement Tonnage (Gross Tonnage *in italics* is additional).
WARSHIPS.				
Battleships { Dreadnoughts	20*	423,350	33	775,850
Battleships { Pre-Dreadnoughts	40	589,385	17†	258,900
Total	60	1,012,735	50	1,034,750
Battle Cruisers	9	187,800	9	206,300
Cruisers	46	510,650	27‡	304,950
Light Cruisers	62	260,100	82§	344,330
Gunboats	28	16,641	52	22,784
Coast Defence Vessels	—	—	1	5,700
Monitors	—	—	33	106,130
Sloops	11	11,330	11	11,738
Fleet Sweeping Vessels (Sloops)	—	—	106	132,800
Flotilla Leaders	1	2,207	26	42,634
Torpedo Boat Destroyers	215	142,546	407	363,695
Torpedo Boats	106	17,906	94	15,831
Submarines	76	30,983	137	131,658
Aircraft Carriers	1	5,600	13	79,077 *5,375*
P. and P.C. Boats	—	—	62	38,932
Minelaying Vessels	7	24,200	8	52,800 *4,298*
Repair Ships	2	20,900	7	38,458 *1,219*
Depôt Ships	22	86,845	49	312,728
Armed Merchant Cruisers	**	—	29	*297,968*
Armed Boarding Steamers	—	—	20	*32,617*
Special Service Ships	—	—	50	*25,000*
Coastal Motor Boats	—	—	66	545
Miscellaneous	2	2,780	15	1,288 *16,361*
Total Warships	648	2,333,223	1,354	3,247,078 *382,838*
AUXILIARY PATROL SERVICE.				
Yachts	—	—	57	*37,000*‖
Patrol Gunboats	—	—	30	20,724
Whalers	—	—	18	4,704
Trawlers	12	5,667	1,520	*350,000*‖
Drifters	—	—	1,365	*113,000*‖
Minesweepers—Paddle or Screw	—	—	156	68,645 *37,600*
Motor Launches	—	—	507	18,252
Motor Drifters and Motor Boats	—	—	74	*5,300*‖
Total Auxiliary Patrol Service	12	5,667	3,727	118,325 *542,900*‖
GRAND TOTAL	660	2,338,890	5,081	3,365,403 *925,738*‖

* One newly commissioned August 7, 1914, not included.
† Excluding 12 Pre-Dreadnought Battleships }
‡ Excluding 10 Cruisers } converted from their original type to Depôt Ships, etc.
§ Excluding 10 Light Cruisers }
‖ Approximate.
** Several fitting out at this date.

War Work of the Corps.

During the Great War, the work of the Royal Corps was very considerably augmented, not only by the increased number of ships of existing types which were required and by the necessity for their

TABLE I. (*continued*).—NUMBERS OF H.M. SHIPS AT THE OUTBREAK OF WAR AND AT DATE OF THE ARMISTICE.

Other Auxiliary Vessels.

In addition to the above the principal Auxiliary Vessels employed on Admiralty Service include—

	August 4, 1914.	November 11, 1918.
Commissioned Escort Ships	—	9
Squadron Supply Ships	*	—
Flotilla Supply Ships	*	—
Colliers	65	283
Oilers	32	225
Store Ships	—	8
Frozen Meat Ships	*	4
Officers' Mess Ship	—	1
Mine Carriers	*	4
Ammunition Ships and Carriers	—	27
Hospital Ships	*	9
Totals	97	570

* Several fitting out at this date.

TABLE II.—H.M. SHIPS AND AUXILIARY VESSELS COMPLETED BETWEEN AUGUST 4, 1914, AND NOVEMBER 11, 1918.

A.—Tonnage completed Annually as compared with Pre-War Output.

Period.	Warships. Approximate Displacement Tonnage.	Auxiliaries. Approximate Displacement Tonnage.
Average for two years preceding the war	179,800	5,000*
August 4, 1914, to June 30, 1915	343,320	12,573
July 1, 1915, to June 30, 1916	522,239	62,869
July 1, 1916, to June 30, 1917	370,601	349,010
July 1, 1917, to June 30, 1918	269,884	273,354
July 1, 1918, to November 11, 1918	96,046	92,305
Totals	1,602,090	754,111

* Estimated.

more rapid construction, but also by the great number of new types which were found requisite by the developments of naval warfare and which necessitated new designs embodying many novel qualities and features. Very extensive modifications were also found necessary

TABLE III.—NUMBER AND TONNAGE OF EACH TYPE OF WARSHIP COMPLETED.

	No.	Approximate Displacement Tonnage.
WARSHIPS—		
Battleships	15*	394,750
Battle Cruisers	3	81,500
Cruisers	3	56,300
Light Cruisers	36†	143,050
China Gunboats	28	9,308
Coast Defence Vessels	2‡	11,400
Monitors	38§	114,255
Sloops	124	155,430
Flotilla Leaders	28‖	45,565
Torpedo Boat Destroyers	255¶	272,895
Submarines	146	151,380
Aircraft Carriers	8**	67,457
P. & P.C. Boats	63	39,957
Repair Ships	2**	9,538
Depôt Ships	8**	48,645
Coastal Motor Boats	83	660
Total H.M. Ships	842	1,602,090

* Includes two purchased from Turkey and one purchased from Chile.
† Includes one built for Royal Australian Navy and two purchased from the Hellenic Government.
‡ Purchased from the Norwegian Government.
§ Includes three purchased from Brazilian Government.
‖ Includes four purchased from the Chilean Government.
¶ Includes one purchased from the Portuguese Government. Four purchased from the Hellenic Government. Three ex-Turkish vessels. Three built for the Royal Australian Navy.
** Includes merchant vessels purchased and reconstructed.

TABLE IV.—NUMBER AND TONNAGE OF EACH TYPE OF AUXILIARY VESSEL COMPLETED.

	No.	Approximate Displacement Tonnage.
AUXILIARY VESSELS—		
Patrol Gunboats	30	26,727
Whalers	15	5,040
Trawlers	282	151,422
Drifters	85	16,777
Paddle Minesweepers	34	27,422
Twin Screw Minesweepers	55	43,000
Tunnel Minesweepers	10	2,825
Boom Defence Vessels	32	9,300
Coast Guard Cruiser	1	883
Oilers	64	432,987
Petrol Carriers	3	3,072
Water Carriers	1	12,788
Tugs	23	15,280
Salvage Vessels	2	1,200
Mooring Vessels	6	4,548
Seaplane Towing Lighters	28	840
Total Auxiliary Vessels	671	754,111
Grand Total H.M. Ships and Auxiliary Vessels	1,513	2,356,201

Of the vessels shown in Tables III. and IV. at the outbreak of war, excluding warships under construction for Foreign Powers subsequently taken over for the Royal Navy, there were on order or laid down:—

Battleships	12	Submarines	25
Battle Cruisers	3	Aircraft Carrier	1
Light Cruisers	17	Depôt Ship	1
Flotilla Leaders	4	Coast Guard Cruiser	1
Torpedo Boat Destroyers	18	Oilers	7

in existing ships as the result of war experience, and this involved a great amount of work on the part of all the Members of the Corps.

Some idea of the enormous increase in the volume of work carried out during the four years of the war may be gathered from the following extract from *Engineering* of April 2, 1920:—

As the designers for the Navy, the Royal Corps of Naval Constructors were responsible between 1910 and 1914 for 13 battleships completed, 6 battle-cruisers, 23 light cruisers, 100 destroyers, 14 submarines, and numerous auxiliaries. This in itself is a good record, especially as it enabled us to keep so far ahead of foreign competitors. In every case on our own lines of development we were to the fore in design. But under the stimulus of war the work expanded in an astonishing degree, not adequately realised by the general public. Compared with the four years named above, the succeeding four, between 1914 and 1918, showed the following results: 12 battleships completed, 3 battle-cruisers, 3 large light cruisers, 34 light cruisers, 24 flotilla leaders, 207 destroyers, 146 submarines, 8 aircraft-carriers, to say nothing of monitors, auxiliaries, etc. Airships, too, should not be omitted, the design of which came under the Royal Corps in 1917. All this work, except the latter, might, of course, have been mere repetition of pre-war designs, but throughout design has kept pace with the lessons of the war. At the outbreak of war we had no 15-in. guns in service. During the war no less than 100 were added to our battle fleets, compared with Germany's 16. Altogether we made a net addition of 118 heavy guns to the battle fleet during the war, compared with Germany's 72, and the added weight of broadside amounted in our case to 226,000 lb., compared with Germany's 77,500 lb. Between 1915 aud 1918 we completed more naval tonnage than in the whole of the previous 25 years, adding something like 2,000,000 tons at a cost which amounted to between four or five times the total cost for construction during the previous four years.

Full details of British naval construction work carried out during the war period will befound in the tables on pages 172 to 174. Briefly, it may be stated that nearly 2½ million tons of ships were added to the fleet at a total cost of about £300,000,000, an amount of work exceeding that carried out in the 25 years preceding the war. In carrying out this enormous programme, special reference should be made to the work of members of the Corps at the Admiralty, at the dockyards, and at contractors' works. Under them the whole of the work on hulls, armour, and protection of the huge fleet above referred to was successfully accomplished, and several records in quick construction were made. The percentage of the cost of designing and construction of these ships bears most favourable comparison with the corresponding figures either in private shipyards or other similar establishments.

The pre-war staff, which was not so great in numbers as comfortably to cope with the ordinary work of peace time, was found totally inadequate for the extra work, and although during the early months cf the war they successfully withstood the strain, steps had to be taken to increase their numbers. The private shipbuilders of the Kingdom were appealed to and very quickly responded by lending the best of their younger designers and draughtsmen. Thirty of these young men were appointed temporary Assistant Constructors. In addition, about twenty-seven of the most capable draughtsmen at the Admiralty were promoted to the same rank, and in the Dockyard Branch four senior foremen were appointed Acting Constructors. All these supernumerary members of the Royal Corps did most excellent work. This temporary increase in the number of the Corps necessitated an increase

in the number of the higher ranks, which was effected by temporarily promoting the most senior of one rank to the rank above. Even with this increased number, the strain of the work was very great and eight of the Corps died from causes directly attributable to overwork. One of the youngest Assistant Constructors, who was serving for twelve months at sea—a service on which all Assistant Constructors have to proceed—lost his life in the Queen Mary at the Battle of Jutland.

From time to time, members of the Royal Corps have left the Service to take up positions outside. Amongst these may be mentioned Mr. W. J. Luke, C.B.E., who has just retired from the position of Shipyard Manager at Messrs. John Brown's, Clydebank; Mr. H. G. Williams, Shipyard Manager at Messrs. Armstrong Whitworth's; Mr. John Smith, General Manager of Messrs. Thornycroft's; Sir Westcott Abell, the first Professor of Naval Architecture at the University of Liverpool and now Chief Surveyor of Lloyd's Register; Professor J. J. Welch, D.Sc., Professor of Naval Architecture at the Armstrong College, Durham University; Professor T. B. Abell, O.B.E., who succeeded his brother at Liverpool University; and Mr. G. S. Baker, O.B.E., in charge of the Experimental Tank at the National Physical Laboratory.

Haslar Experiment Tank.

As has been already mentioned in the approved Establishment of the Royal Corps of Naval Constructors, two Assistant Constructors are borne for service at the Admiralty Experiment Tank at Haslar, which is directly under the orders of the Director of Naval Construction, and carries out all model work in connection with the resistance and propulsion of warships. Originally this tank was at Torquay under the supervision of Mr. W. Froude, but later was transferred to Haslar under Mr. R. E. Froude. Even before the formation of the Royal Corps, Mr. W. Froude always had the assistance of two past students of the Kensington or Greenwich Schools, and this assistance has been continued down to the present day. There is little doubt that Messrs. W. & R. E. Froude have, by their work in the Torquay and Haslar Tanks, completely elucidated the complicated problems of resistance, propulsion, and rolling of ships, and placed them on such a basis as to be of the greatest use to the whole civilised world. In this work they have been ably assisted by those members of the Royal Corps of Naval Constructors who have had the privilege of serving under them, and also the active and generous encouragement of the successive Directors of Naval Construction. Mr. R. E. Froude, who had superintended the work at the Tank at Haslar since its foundation, retired from this position three years ago, and has been succeeded by a member of the Royal Corps, holding the rank of Chief Constructor. In connection with the subject of resistance and propulsion of ships, it is worthy of remark that Admiral D. W. Taylor, Head of the United States Construction Corps, and who has considerably supplemented the work of the two Froudes, passed through the Royal Naval College at Greenwich with high honours.

External Work of the Corps.

It is, perhaps, only natural that the Royal Corps should look upon the Institution of Naval Architects with special regard, for it is to the first Council of the Institution that they are indebted for that movement which resulted in the reopening of a School of Naval Architecture at South Kensington in 1864, and which placed the education of naval architects in this country, and also to a great extent in other countries, on a sure and sound basis. The records of the Institution bear notable testimony to the work of the Royal Corps, and its immediate predecessors, in the form of papers in which practically all phases of naval architecture are dealt with. It is not too much to say that the *Transactions* of the Institution are carefully studied by naval architects and engineers all over the world, and especially those portions dealing with warships which have been contributed by members of the Royal Corps. It is, indeed, a rare volume of the *Transactions* which does not contain one interesting paper by a present or past member of the Corps.

In addition to the regular work of the design and construction of ships for H.M. Navy, it has frequently been the case of late years, and especially during the war, that members of the Royal Corps have been called upon to assist in work for other Departments, not only within the Admiralty but for various Government Offices.

Until 1917 the Director of Naval Construction was responsible for the design and construction of all rigid airships. This responsibility was later handed over to the Airship Production Section at the Admiralty, but the several officers of the Royal Corps were still kept on for the work on the design and construction upon which they had been engaged. Later, the Air Ministry took over the whole of this work with the Staff, including these members of the Royal Corps.

In 1915 the Director of Naval Construction was asked by Mr. Winston Churchill, who was then First Lord, to take up the design of landships, and was appointed Head of the Landships Committee, thus becoming responsible for the design and construction of the first tanks. Later, when the production of tanks was handed over to the Munitions Ministry, the Director of Naval Construction still remained Chief Technical Adviser on all tank matters, finally becoming the Vice-President of the Tank Board in 1918, until the end of the war.

For other Government Offices, the work carried out by the members of the Corps includes work upon the designs of the cable-laying ships for the Post Office, of various craft and special floating docks for the Air Ministry, and work for the India and Colonial Offices.

Preparation of Designs.

It is thought that some account of the work done by the Royal Corps in the preparation of warship designs may be of interest to readers of the "Annual." To appreciate this, it is necessary to

explain that the Department of the Director of Naval Construction is responsible to the Board of Admiralty for the design of all ships and craft required for H.M. Navy, the Director being the Principal Technical Adviser to the Admiralty and being held personally responsible for the success of the design. To describe fully the complex and difficult problems to be solved and the work involved in the production of a successful design would take far too long; but the procedure adopted is generally as follows: The Director of Naval Construction first receives instructions from the Board, conveyed to him by the Controller, who is specially charged with all *matériel* of the Navy, to get out a sketch design embodying certain main features, such as guns to be carried, the armour protection required, and the speed. This work involves the investigation of the weights of completed ships as regards the items of hull and machinery, and guns and torpedoes, and the consultation with other Departments as to any variation which may be required in these weights or the spaces taken up due to the developments in naval *matériel*. By a co-ordination of these results and inquiries, a close approximation to the displacement of the completed ship can be obtained.

When this is known, the dimensions can be settled by a consideration of the length required to obtain the maximum speed economically and the breadth from considerations of stability. At this stage it is most important to bear in mind the main purpose and probable sphere of action which the ship will have to fulfil, and this involves careful consideration of docking facilities, canal and harbour dimensions in different parts of the world, so that the vessel can be accommodated as necessary for docking, fuelling, etc. The length, breadth, and draught are thus determined corresponding to the assumed displacement, speed, and distribution of weights in both the vertical and longitudinal directions. An approximation to the required form can then be obtained and estimates made as to the horse-power required for the given speed, from records of the performances of previous ships. At a later stage it is the usual practice to run models in the Haslar Experiment Tank to obtain more reliable results in confirmation of the estimate of the horse-power required for the speed.

With the approximate form known, the arrangements of armament, armour, boiler-rooms, machinery spaces, can generally be settled and compared with the approximations first arrived at. As a rule, alterations are necessary, either in weight or in position, before the final result is found satisfactory in all important respects and before all the Board's requirements are embodied. Having obtained this satisfactory agreement, the sketch design showing all important features and together with a legend of weights corresponding to these features, is submitted to the Board. Although the above is the orthodox procedure, it has frequently happened, and this was especially so during the war, that the Director of Naval Construction, who is naturally always taking account of the advances in engineering and shipbuilding science, has been in a position to initiate proposals for designs of improved or new types of vessels,

and many of the ships built during the war were from designs submitted to the Board and adopted, with perhaps some modifications, as acceptable types, upon the suggestion of the Director of Naval Construction. Often alternative designs, in which some of the features are rearranged to secure the same final result but having some advantages in one feature, and disadvantages in the others, are also prepared.

From an early stage these sketch designs are considered by the Naval Staff and discussed with the Director of Naval Construction and possibly further alterations may be required until a design embodying Staff requirements is arrived at. As soon as the design is finally approved, the more detailed drawings and full specifications are started and the work of completing them proceeded with, so that the whole may be in a fit state for tendering firms to submit prices. This completion stage of the design often occupies several months in the case of a large ship, for it involves detailed calculations as to the weight of hull, the stability in several conditions, both intact and damaged, the strength of the ship amongst waves, and other similar calculations, all of which are checked by independent calculations before being taken as correct. In addition to these calculations, drawings of the spaces required for the armament, boilers, main and auxiliary machinery, have to be prepared and checked to ascertain if they are sufficient in size and extent for the purpose intended. At the same time, the specification for the hull has to be proceeded with, and the scantlings of the various portions carefully decided, so that the requisite strength shown necessary by the calculations is secured.

The spaces for the main items having been arranged in consultation with the Departments responsible for the satisfactory arrangement and working of their several portions of the design, the remaining spaces have to be disposed for the stowage of fuel, water, provisions, stores, accommodation of officers and men, and the other multitudinous requirements of a modern warship. Finally, when these are all completely settled, the design is again considered by the Board and, if approved, the sheer drawing, midship section, and arrangement plans receive the official Board stamp, and the design is ready for tendering purposes and for building, either at a Royal Dockyard or by contract.

Such, then, is the procedure adopted in one branch of the activities of the Royal Corps of Naval Constructors, and only those who have participated in the work involved can appreciate the trouble and anxiety which it entails or the satisfaction which is felt when the design is translated into the completed ship which has successfully passed through her trials and has proved that she possesses those qualities which the Board of Amiralty, some three or four years before, had approved for her. The vessel then takes her place in the fighting line and sketch designs embodying improvements in her, which perhaps another Board consider necessary, are prepared by the Royal Corps of Naval Constructors.

Co-operation with other Departments.

In developing the design from the sketch stage down to the completely detailed plans and specifications, the Director of Naval Construction and his staff are continually in communication with other departments at the Admiralty. The closest co-operation is maintained between the departments of the Directors of Naval Construction, the Engineer-in-Chief, the Directors of Naval Ordnance, of Electrical Engineering, of Naval Equipment, and many other departments. Thus the interchange of ideas between the designers and users, and the co-ordination of the whole design and structure of the ship is always kept fully in view, and since the new organisation of the Staff at the Admiralty, this *liaison* between the technical and the executive officers has been more complete than has probably been the case at any other period. Thus all the points which tend to make a ship a successful fighting unit receive the fullest consideration and are developed in the best possible manner.

The Staff Officer who is specially charged with all matters connected with the design of ships is the Assistant Chief of the Naval Staff, this post now being held by Admiral Chatfield. It may be interesting to quote some remarks of Admiral Chatfield made at the Spring Meetings of the Institution of Naval Architects in 1921 on the subject of the work of the Royal Corps, as follows:—

> It was a remarkable fact that from that building (the Admiralty) have emanated first of all the Dreadnought, the battle-cruiser, the present type of light cruiser, the modern destroyer, the fast service submarine, and the modern idea of torpedo protection. We have led the way, or our predecessors have led the way, in the armaments of capital ships with great effect. Now that work has only been rendered possible by the constructive department of the Admiralty possessing the greatest imagination, initiative, resource, and you may say audacity. It is very necessary to bear that in mind, for this is a moment when surely it is essential the country shall have confidence in her naval architects, as I am sure this tribunal has. We are about to lay down some new ships. Well, if you remember, as was pointed out this morning, Great Britain produced the 15-in. battleship two years before the Baden. I think it will give you renewed confidence in your Naval Architects, and you will be able to feel that the money which you are asked to pay, at so much sacrifice, at a time of such great financial difficulty, will not be spent uselessly, but will adequately meet the needs of the day and the lessons of the war.

Conclusion.

Regarding the work of the Royal Corps as a whole, it is certain that at no time has the importance of the *matériel* of the Navy been brought into such prominence as during the progress and since the end of the war. This was specially emphasised by the Washington Conference, during which nearly the whole discussion revolved round the question of the numbers and size and armament of ships to be included in the navies of the Great Powers, the clauses of the proposed treaty giving definite figures for the displacement and guns of different types of ships which could be retained or built. This is really the first time it has been laid down in set terms that the power of a navy is dependent on the numbers and size of the ships themselves, which therefore governs every other item which goes to make up a navy.

Lord Lee of Fareham, in responding to the toast "Our Royal and Merchant Navies," submitted by Sir Edward Clarke at the dinner of the Shipwrights' Company on June 26, 1922, said:

The Navy and the Mercantile Marine were our rock in time of war. We needed the shipwrights, which the Company so worthily represented, and to the great works of the Royal Corps of Naval Constructors we owed the fact that our seafaring peoples had been able to make their weight and abilities felt in the great conflict in which we had been engaged. He sometimes thought that the Royal Corps of Naval Constructors had never been fully appreciated. He knew how closely they were associated with the Shipwrights' Company. The Company, he believed, was more closely associated with the craft it professed to represent than almost any other Company in the City of London. (Hear, hear.) The Shipwrights' Company required that its members should have some technical qualification. All knew what not only the Royal Navy but the Mercantile Marine owed to Sir Charles Parsons. (Cheers.) As inventor of the turbine, he ranked only second to the discoverer of steam power. When he (the speaker) looked through the names of those of the Company who had held high office, he realised what a very important and momentous part the Company had played in the development both of the Royal Navy and of the Mercantile Marine. Referring to the work of the Royal Corps of Naval Constructors, he said they produced at a moment's notice so to speak, the two great battle-cruisers, the Repulse and the Renown, which were of entirely new design. The ships were designed, completed, and at sea within 18 months of the time of giving the order. (Cheers.) It was a record in the history of the shipbuilding world. Shipbuilders had entered upon very lean times. So far as warships were concerned, the last four years had been pretty lean, and the next ten would be even more so. It was beneficial, he thought, to the people of the world that a pause in the construction of ships had taken place; but, somehow or other, the sacred flame must be kept alive—the flame of genius which had distinguished British constructors, whether naval or mercantile, through all the centuries. In spite of the agreements at Washington, various classes of craft would be very necessary for the completion of the navies of the future. The Treaty of Washington had not discouraged the building of warships for foreign account, except as regarded certain limitations of size and armament. England, added the first Lord, would be at a disadvantage as compared with America and Japan if she did not build the two new battleships embodying the lessons suggested by the Battle of Jutland. It would be an intolerable position for the greatest naval Power. (Hear, hear.) So far from their wishing to discourage the Air Service, the complaint was that development was not nearly fast enough.

Following the steps of their predecessors, the great Master Shipwrights, it has throughout been the steady aim of the Royal Corps of Naval Constructors to design and build for the Navy the best possible ships wherewith to carry out the work on which the prosperity and existence of the Empire depends. The extent to which that aim has been achieved can best be judged by the ships of many types which made up the squadrons and flotillas of the Grand Fleet, that fleet which had been steadily increasing in power and efficiency until it accepted the final surrender of the enemy at Scapa in November, 1918.

I should like to place on record the debt I owe, for his assistance in compiling this article, to Mr. A. W. Johns, C.B.E., Assistant Director of Naval Construction, who has made a special study of the history of the building of ships for the Royal Navy from early days, and of the work of the Royal Corps in particular.

EUSTACE H. T. D'EYNCOURT.

CHAPTER XIII.

Retrenchment of Officers.

Promotion and Retirement.

After all the wars of the eighteenth century, the retrenchment of naval officers and men led to great distress. Not only did the numbers voted by Parliament fluctuate considerably, but the conditions which obtained were such that there was practically nothing to minimise or soften the shock of each reduction in strength. The total numbers of seamen and marines voted rose from 7,000 in 1733 to 40,000 in 1741, but in 1755 it had dropped to 12,000, only to rise to 70,000 by 1760. Obviously the casting adrift of such large numbers of seamen as soon as their services were no longer required inflicted grave and widespread hardship, equally upon officers as upon the men. The former had no idea when they might get further employment, save, perhaps, to some extent in foreign service or the Mercantile Marine, and there was no such thing as a pension or retired pay as known to-day.

From the year 1700, the privilege of half-pay, which had originally been allowed "during their being ashore in times of peace" to all flag-officers, captains of first, second, third, fourth, and fifth rates, and all first-lieutenants and masters who had served one year in such rates, or had been in a general engagement with the enemy, was limited to 10 flag-officers, 50 captains, 100 lieutenants, and 30 masters. Retired pay to a limited extent began in 1747, when the superannuation of senior captains—indisposed or too infirm to accept active flag rank—with the rank of rear-admiral, gave rise to the term "yellow admirals," but this scheme was intended chiefly to remove officers at the top of the list in order to promote their juniors, and made no general provision for the Service as a whole. Many officers, therefore, came ashore after a war with no more than their pay for past service. All through the seventeenth and eighteenth centuries it was the rule not to pay anybody until the end of the commission, and the superior officers drew bills, the rest of the ships' companies being given tickets. If they had private means or well-to-do friends, the officers were able to get advances, and latterly these were got through agents, but the junior officers and men could only realise by selling or pawning the "scraps of paper" which represented their long overdue wages. Lord Spencer, when First Lord, procured for officers, when serving abroad, the privilege of drawing quarterly bills, as their pay became due; formerly they were paid only when in England; but even after this concession was made

the officers suffered considerable loss in getting their bills discounted. Thus even while the State provision for officers after a war was quite inadequate or non-existent, there was little or no encouragement given them to make provision for themselves, even if this had been possible on the meagre pay then in force.

Conditions after Trafalgar.

But to afford a groundwork of comparison with the conditions obtaining at the present time, it is necessary to examine the state of the Navy and the position of the bulk of its officers after the last great maritime war in 1815. Half-pay had by this time become general, and in the absence of retired pay, as known to-day, it was by an increase of half-pay, on which officers sometimes remained for many years at a stretch, that some amelioration of the lot of retrenched officers had to be made. Writing in April, 1814, a correspondent of the *Naval Chronicle* appeals to the Admiralty on behalf of such officers, "hoping some addition may be made to their half-pay, now that the scene of war is about to close." Such an addition was indeed made by Admiralty order of June 8, 1814, which fixed the following rates: admirals of the fleet, £3 3*s.* per day; admirals, £2 2*s.*; vice-admirals, £1 12*s.* 6*d.*; rear-admirals, £1 5*s.*; first 100 captains, 14*s.* 6*d.*; next 150, 12*s.* 6*d.*; remaining captains, 10*s.* 6*d.*; first 150 commanders, 10*s.*; remainder, 8*s.* 6*d.*; first 300 lieutenants, 7*s.*; next 700, 5*s.*; remainder, 5*s.*—all per day. Obviously for the junior grades this provision was quite inadequate for them to maintain themselves and their families in that state which was expected of them. But even worse was the plight of those outside the scale, such as the masters' mates and midshipmen. The numbers of passed midshipmen were stated to be about 1000, some with three, four, or six years' war service; in fact, one such "old passed midshipman," referred in the *Naval Chronicle* to two cases which had passed under his own knowledge in which the period of service was twelve years! Another correspondent, writing satirically under the title of "Much Cry and Little Wool," upon the profession of Lord Liverpool in the House of Lords, and the Chancellor of the Exchequer in the House of Commons, "to see the officers of the Navy comfortably provided for," proposed that commanders ought not to have less than £200 to £300 a year, lieutenants from £130 to £200, liable to increase according to families, and that passed midshipmen should receive a proportionate sum.

The absence of regular methods of retirement, and of non-service rules such as those in force to-day, led to overcrowded lists and stagnation in promotion. It was often advocated that this would not have been the case if retirement had been allowed, as in the military profession; but, instead of this, officers were kept for years on the half-pay lists, and thus it came about that lieutenants of over thirty years' standing were employed in the Napoleonic war, and there were isolated cases of commanders having had even sixty years' commissioned service. A near approach in principle to the special retirement scheme of to-day was suggested on March 14, 1816, by a

writer signing himself "Nestor," who put forward the idea of a large naval retired list, with what he called a brevet promotion of commanders and lieutenants. He proposed that commanders and lieutenants from 1796 to 1806 should be called on for memorials, stating their actual services, wounds, etc., so that a selection could be made of the most meritorious. "By such a plan," he affirmed, "the claims of officers *without interest* would be fairly before the Board, and must meet at last with the promotion they still so anxiously aspire to. . . . The Board must be fully aware of the *justice*, the *propriety*, and the *necessity* of no longer condemning these brave, though friendless men, so long the faithful defenders of their country, to *unmerited obscurity*, and a scanty pittance of half-pay, much enlarged, but still inferior to their wants." In a later issue of the *Naval Chronicle* for the same year, the numbers on the very limited retired lists are referred to. It appears that only a few post-captains were retired; of commanders, none at all; and of lieutenants, only 100 out of about 4,000. The writer must, of course, mean superannuated officers when he speaks of those on the retired list. By an Order in Council, dated January 30, 1816, 100 of the senior lieutenants were permitted to accept superannuation with the rank of commander and 8*s.* 6*d.* a day pension. But for the great bulk of the officers, there was no alternative but to endeavour to exist in a state of great poverty. Some, more fortunate than the rest, may have obtained employment in the Mercantile Marine, but following the war trade was very bad. Others sought to retrieve their shattered fortunes by entering the naval service of other countries, and others again obtained grants of land in the colonies, and so helped in the peopling of Australia and Canada.

The Welfare of the Service in the Nineteenth Century.

It will have been noticed that in the treatment, or lack of treatment, of this great problem a century ago, while there was scanty consideration for the officers who were victimised by it, there was no regard whatever for the future welfare of the Service. That is to say, no effort appears to have been made so to reduce the lists of effective officers that a normal and reasonable flow of promotion should be possible for those remaining in active employment. With the promotions made for service in the war, the captains' list reached in 1818 a total of 883, the highest in the history of the Navy. But in the absence of a clearance scheme, the evil of stagnation remained, growing more acute year by year. The Navy List of February, 1841, shows that no less than 683 captains were still on the list, headed by 20 captains who had thirty-five years' seniority, having been promoted in the year after Trafalgar. Moreover, nearly one-half the entire number—318, to be exact—had served for over twenty years as captains. The number of retired captains, who under an Order in Council of August 10, 1840, had gone on half-pay of £191 12*s.* 6*d.* per annum, was only 45. Equally congested was the commanders' list, numbering 759, of which the senior had been promoted in 1794, or forty-seven years before, after fourteen years as a lieutenant.

The lieutenants' list numbered 2,754, of which the senior obtained his commission in 1781, or sixty years before. The latter officer, of course, was not employed, but there were lieutenants in the Coastguard with seniority of 1800 and 1802; and one, with seniority of 1806, was actually in command of the steam-vessel Merlin.

The First Effective Retirement Scheme.

It was not until June 25, 1851, that the first attempt at a really effective scheme of naval retirement was made—thirty-five years too late it may almost be said. This measure reduced the number of flag officers from 150 to 99, the number of captains from 493 to a permanent maximum of 350, commanders from 830 to 350, and lieutenants from 2,162 to 1,200, and made various retiring arrangements accordingly. It was at this date that the rule, which still obtains, of not permitting any captain to pass on to the flag list who had not completed his sea time was instituted. The senior captain being always chosen to fill a vacancy, it followed that if he was not so advanced, but was placed on a reserved list in consequence, and the next captain, if qualified, promoted instead, two or more vacancies occurred on the captains' list for one on the flag list. Promotion from commander to captain was checked by only one vacancy in three being filled until the captains' list came down to its new establishment of 350, and the same rule obtained in advancements from lieutenant to commander. The reduction of the lieutenants' list from 2,000 to 1,200 could not be effected without occasionally causing much distress. Many of them were old men, the senior lieutenant being of seventeen years' standing, and outlets for these officers in the Coastguard, the dock and victualling yards, and the packet service were now removed or curtailed.

Compulsory Age Retirements Introduced.

Before the next move was made, there occurred the war with Russia, with its demonstration of the evils of aged admirals in command and other defects of our naval policy. It was at this time that several officers of the Mercantile Marine were taken in for service as navigators, and the war was followed by the establishment of the Royal Naval Reserve and a system of continuous service for the men. In spite of the operation of the 1851 rules, the lists still remained congested in 1856, and a further attempt was made to improve matters, by increasing the opportunities for retirement offered to commanders and lieutenants. Four years later, it was again considered necessary to do something, and for the first time compulsory age retirements were introduced. All captains attaining the age of sixty without having served were compulsorily retired, and commanders and lieutenants, whether they had served or not, were also made to retire at this age.

Still the blocks continued, and new retirement schemes were necessary in 1864 and 1866, owing partly, it may be, to the reduction at this time in the material of the Fleet, which obliged

a larger number of officers to be kept on half-pay. The latter condition was itself the subject of outcry on several occasions. Vice-Admiral P. H. Colomb, in his study of "Fifteen Years of Naval Retirement" (Griffin, 1886), expresses his difficulty in accounting for a gradual change from the method of 1851—when there was very little compulsion, with a great deal of persuasion, and which had a good deal of success—to the scheme of 1866, when there was very little persuasion and a great deal of compulsion, and which did not succeed at all. Colomb's view was that compulsory retirement should not be applied to any officer; that retirement and retired pay should be compensation for disappointment, not the reward of service; and that temptation to retire should be placed in the way of senior commanders and lieutenants, whose prospects otherwise would be at a low ebb.

He considered that men "should be encouraged to serve their country in an honourable poverty, rather than to look to quitting its service with a good round pension," and it is curious now to see how he defended large half-pay lists, for one reason because if all the officers on the active list were in billets, there would be an immense outcry for rest.

Childers Retirement Scheme of 1870.

Many circumstances, therefore, contributed to the situation which brought about in 1870 the great retirement scheme of Mr. Childers, then First Lord of the Admiralty. In Admiral Colomb's view, practically the only new feature of this scheme was the remarkable temptation held out to all ranks not to accept voluntary retirement if they could help it. "Every officer, without material exception, who was offered voluntary retirement in 1870 was at the same time told that if he waited until 1871 it would be better for him, in 1872 still better, and so on till the inference was that he had better await the action of the compulsory clauses." Up to 1860, efforts to reduce the redundant numbers of officers relied more on the choice and option of the individual than on any power outside him. Then this kind of effort ceased, and the proportions in which compulsion and persuasion mixed began to be reversed. In 1870, compulsion reached its highest point, and relaxation became the order of the day instead.

In later modifications of the retirement regulations, there was not the same difficulty, especially after 1884, because the material of the Navy increased, with a corresponding demand for more officers. So much was this the case that, in the 'nineties, supplementary officers had to be taken in from the Mercantile Marine. Similarly, the great expansion brought about by the German menace led to a further entry of supplementary lieutenants, and to the revival of direct entry to the Royal Marines, the entry of special naval cadets from the public schools, and the granting of commissions as lieutenants to lower-deck ratings. Contrary to many predictions, the recent war found us with no shortage of officers for all the immediate needs of the Fleet. Moreover, the officers were, on the whole, of suitable age and experience. Thanks largely to retirements

from the flag list being speeded up from 1903 by more stringent non-service rules and by tighter age conditions, we had a very young flag list, to the undoubted advantage of the country, and to the benefit of the junior grades, the vacancies in which were naturally increased by more frequent changes at the top.

The Effect of the End of the Great War.

The end of the war brought the Admiralty face to face with a problem essentially the same as that of a hundred years ago, but with the conditions entirely different. By means of the R.N.R. and R.N.V.R. organisations, a large war influx of officers was possible without disturbing the general cadre of officers of the Royal Navy, and the demobilisation of these Reserve officers relieved the authorities of a great burden as compared with their predecessors after the Napoleonic wars. A tentative attempt to remove some of the surplus officers was made by Admiralty order of April 7, 1920, offering special terms of retirement for six months, especially to lieutenant-commanders, lieutenants, and mates. The chief features of this scheme were the offer of standard rates of retired pay to officers below the age of forty, who had previously not been entitled to it, and the offer of gratuities to officers below the age of thirty-six, up to £2,500 for lieutenant-commanders, with an addition of £200 for each year's seniority in the rank. The scheme had little success; it was not of a comprehensive character, and had not for its immediate purpose a saving of public expenditure. It was a piecemeal effort to ward off one or two local "blocks" which threatened to produce future stagnation.

In the spring of 1922, however, the urgent feeling of the need for retrenchment in public expenditure, as evidenced by the appointment of the Geddes Committee, coupled with the large reductions, both actual and prospective, in fleet strength as a result of the Washington Conference, led for the first time to a bold attempt to tackle the problem of surplus naval officers as a whole. Although there may be a few hard cases, as is inevitable in any such scheme, —and of course nothing can minimise the disinclination felt by officers to relinquish a lifelong profession—still it is generally admitted that this was a sincere attempt to do justice, and to deal generously with a class of public servants who, after all, deserve well of the nation. The Admiralty order on the subject was very full and explicit. After setting forth the approximate number of surplus officers (1,835 altogether) in the various grades, it was stated that with the large reduction of requirements, the result of keeping all these officers on the active list would be to necessitate long periods of unemployment for the great majority of officers and to block promotion for all officers for many years, a course obviously not in the interests either of the efficiency or well-being and content of the Navy. The Board, therefore, as in 1920, decided to invite officers of the branches and seniorities affected to retire on special terms, but recognised that, in view of the large numbers to be dispensed with, it would almost certainly not be possible to effect a sufficient

reduction by this means. Here the compulsory element came in. The special terms were to be open for a maximum of six months from May 12, 1922. In order that it might be clear that no officer would attain better terms by waiting, it was notified that no officer promoted after June 30, 1922, would be allowed to retire on the special terms; rates of pay were to depend on the officer's position on August 12, 1922, whether he retired before or after that date; and gratuities, the amounts of which were to depend upon the length of time by which an officer's normal expectation of service was curtailed, were determined with reference to the interval between the date of ceasing full, unemployed, or half-pay, and the date of attainment of the age for compulsory retirement under existing regulations.

The Present Retrenchment Scheme.

The method of securing the retirement of sufficient officers for retrenchment was as follows: Officers liable to be placed on unemployed or half-pay when no employment was available for them, were to be invited to retire on the special terms. Should the response to this invitation be found likely to be insufficient, said the order, "the requisite number of officers to complete the necessary reductions will be selected and given the alternative of retiring with the special terms, or of being placed on unemployed or half-pay (if the officers are not already on unemployed or half-pay) and informed that no further employment is available for them. They will, in the latter case, be placed on the retired list on completing the period of non-service after which, under existing regulations, retirement is compulsory." How selections were to be arrived at has not been made known.

The purpose of this chapter has been to sketch the circumstances arising out of the retrenchment of the Navy following the peace in 1815, with its widespread distress, by way of contrast with the enormously improved conditions now presented at the end of a great war. The helpless attitude of the Melville administration in regard to the officers had a twofold effect. It caused great want and misery to the gallant men who had fought in the war, and their dependents, but it also failed to provide the necessary machinery for promoting a corps of comparatively young senior officers, flowing smoothly out from the much more numerous lower grades into the naturally limited numbers of the higher ranks, and to ensure that these officers, placed in charge of ships and fleets, should be efficient. Ever since there have been, as here shown, attempts to remedy this omission, but until now the measures taken have been only palliative, and often expensive, if not extravagant. The present Board, with all the facts before them, have produced what is obviously a well-thought-out and comprehensive scheme, the temporary measures of which will certainly have an immediate effect in reducing the lists. Whether the permanent retirement rules will solve the problem in future, time alone will show.

Chas. N. Robinson.

MERCHANT SHIPPING SECTION.

CUNARD LINER SAMARIA

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CHAPTER I.

THE WORLD'S MERCANTILE MARINE.

THE end of the year 1922 seems to be sufficiently remote from the vast upheaval of the European War to leave behind some of the more transitory results of that conflict and to expose some of the more permanent difficulties which have yet to be overcome before a proper state of equilibrium in international affairs can be reached, with the inevitable reaction on shipping.

While it is yet early to forecast, with any degree of accuracy, the final redistribution of the various national fleets, yet the experiences of the past year have revealed more and more clearly the fact that the situation created by the Treaty of Versailles was certainly artificial and that the Treaty may not be a permanent solution.

It will be well, therefore, to investigate generally the trend of present developments which must ultimately result in some sort of approximate equilibrium, which will not necessarily be the same as that which existed in pre-war days.

In the "Annual" of 1921–22, the writer drew attention to the revival of the purely national spirit as one of the great effects of the war, and showed the influence of this movement in the renewal of interest in national mercantile marines.

While the present article must be mainly concerned with the facts and figures of the post-war position of various maritime countries, yet the interpretation of these figures must depend on the degree of importance to be assigned to the various nationalist tendencies. In this connection it is important to realise that shipping is a marketable commodity the price of which is fixed by international demand, and which is liable to the laws which govern the supply and demand for the use or manufacture of any other commodity. At a very early date public opinion in this country realised that it was almost impossible to nationalise shipping, for the result would have been an attempt to nationalise an international commodity, which, on the face of it, is absurd. In the same way, it is impossible for any country to require that its whole trade should be carried in its own ships, for what are imports for one country are exports for the other, and consequently any attempt at monopoly must of necessity disturb international relations and react unfavourably on the economic position of the country which attempts to enact such legislation.

It must follow from these first principles that the final distribution of the world's fleets is inevitably determined by the economic position of the maritime countries, and that, as history has so often proved, any attempt to maintain artificially a merchant marine which

is not primarily based on the economic position of the country concerned must ultimately fail.

Post-War Economic Position.

We may well then, before passing to the main part of the subject, see in what way the war has affected the economic position of the various maritime countries, and what is the probable trend of future developments. Perhaps the most striking evidence of the effect of the war is furnished by the index numbers of the Course of Wholesale Prices which are now published by several of the more important countries. Reduced to a comparative basis, these "Wholesale Price Indexes" show a very great similarity of movement up to the year 1914. During and after the war, however, great disparity has been revealed, and the level of prices is now widely different in the five countries chosen as examples, which are set forth in Table I.

Table I.—The Course of Wholesale Prices in Various Countries.

(Average for the year 1895 * in the United Kingdom equals 100.)

Year.	United Kingdom.	United States.	France.	Japan.	Germany.
1895	100*	92	100	—	100
1901	113	107	112	100	122
1905	116	114	116	120	113
1910	126	129	127	125	125
1915	174	134	191	167	132
1920	398	324	692	356	1735

It will be observed from this table that in the year 1895 there was practically parity of values in Europe, but difference of about 8 per cent. in favour of the United States at that time, a difference which may perhaps have been caused by continental variations.

It will also be seen that by 1910 there was practically parity of values, not only in Europe, but in the United States of America and Japan, which may have been brought about by freer interchange of commodities.

The figures for the year 1915 seem to indicate that the United States was improving its position at the expense of other countries, but that there was not much difference in the values for the other countries, except for Germany.

The figures for 1920 indicate that a serious difference of values occurred in all the countries, and if these again be reduced to 100 as a standard, it will be found that the relative values are: 81 for the United States, 174 for France, and 435 for Germany, which is considerably different from the equilibrium position for 1910.

The figures are not available for the present day, but there is no doubt that, as far as the United Kingdom and the United States are

* In this table, for purposes of comparison, the Wholesale Prices Index for the United Kingdom for the year 1895 has been taken as 100, this year being taken as a standard because it was a period of practically the lowest prices which were experienced for half a century.

concerned, there has been a greater approximation to pre-war conditions; but the degree of divergence from such conditions indicates that the state of equilibrium is still a long way off, and suggests that such equilibrium may not be of the same order as it was in pre-war days. Such few and hasty generalisations may, perhaps, serve to throw some light upon the changes which have taken, and must take, place in the distribution of the world's mercantile marine.

TABLE II.—SEA-GOING STEEL AND IRON STEAM TONNAGE OWNED BY THE PRINCIPAL MARITIME COUNTRIES.

(Thousands of gross tons, *i.e.* 000's omitted.)

Country.	As at June, 1914.	As at June, 1921.	As at June, 1922.	Differences.		
				June, 1914, and June, 1921.	June, 1914, and June, 1922.	June, 1921, and June, 1922.
United Kingdom . . .	18,877	19,288	19,053	+411	+176	−235
British Dominions . .	1,407	1,950	2,201	+543	+794	+251
America (United States)	1,837	12,314	12,506	+10,477	+10,669	+192
Austria-Hungary . . .	1,052	Nil.	Nil.	—	—	—
Denmark	768	866	944	+98	+176	+78
France	1,918	3,046	3,303	+1,128	+1,385	+257
Germany	5,098	654	1,783	−4,444	−3,315	+1,129
Greece	820	576	653	−244	−167	+77
Holland	1,471	2,207	2,613	+736	+1,142	+406
Italy	1,428	2,378	2,600	+950	+1,172	+222
Japan	1,642	3,063	3,325	+1,421	+1,683	+262
Norway	1,923	2,285	2,337	+362	+414	+52
Spain	883	1,094	1,187	+211	+304	+93
Sweden	992	1,037	996	+45	+4	−41
Others	2,398	3,459	3,301	+1,061	+913	−158
Total Abroad . .	23,637	34,929	37,749	+11,292	+14,112	+2,820
World's Total . .	42,514	54,217	56,802	+11,703	+14,288	+2,585

This table does not include Canadian and American lake vessels.

THE DISTRIBUTION OF TONNAGE.

Table II. shows the amount of seagoing steam steel and iron tonnage owned by the principal countries before the war, and at June, 1921, and June, 1922. Last year the writer commented on the changes brought about by the war. The further year's figures, which now become available, bear testimony to the fact that economic verities are far stronger than political treaties. Germany, mulcted at Versailles of the main portion of her overseas fleet, has during the last year recovered over a million tons of such vessels, partly by new construction and partly by repurchase of surrendered vessels, while the United Kingdom has lost, roughly, a quarter of a million tons. The retention of the large quantity of ex-enemy tonnage made available by the Versailles Treaty, together with the concession permitting replacement by new construction, was not economically justified.

It is to be noted that practically every other country has increased its tonnage at a time when there was already too much tonnage in the world and a considerable amount of unemployment in shipping, and it is to be feared that most of those countries which have increased their fleets consequent upon a revival of the nationalist spirit (to which attention has already been drawn), will suffer a decline in the next few years, which would not have arisen had they followed the policy of jettison which appears to have been adopted by British shipowners.

Table III. shows the percentage of the world's total steel and iron seagoing steam tonnage owned by the various maritime countries. The remarkable recovery of Germany from 1·2 per cent. in 1921 to

TABLE III.—PERCENTAGE OF THE WORLD'S TOTAL STEEL AND IRON SEA-GOING STEAM TONNAGE OWNED BY THE PRINCIPAL MARITIME COUNTRIES.

Country.	As at June, 1914.	As at June, 1921.	As at June, 1922.
United Kingdom	44·4	35·6	33·5
British Dominions	3·3	3·6	3·9
British Empire	47·7	39·2	37·4
United States	4·3	22·7	22·0
Austria-Hungary	2·5	Nil.	Nil.
Denmark	1·8	1·7	1·7
France	4·5	5·6	5·8
Germany	12·0	1·2	3·1
Greece	1·9	1·1	1·2
Holland	3·5	4·1	4·6
Italy	3·4	4·4	4·6
Japan	3·9	5·6	5·9
Norway	4·5	4·2	4·1
Spain	2·1	2·0	2·1
Sweden	2·3	1·9	1·7
Others	5·6	6·3	5·8
	100·0	100·0	100·0

3·1 per cent. in 1922 is again to be noticed, as well as the drop in the United Kingdom figure from 35·6 to 33·5 per cent. during the same twelve months. The other most significant feature of the table, is the drop of American tonnage during the last year from 22·7 to 22·0 per cent. The abrupt rise from 4·3 per cent. in 1914 to 22·7 per cent. in 1921 was economically unsound, and even the slight drop of 0·7 per cent. is sufficient to indicate that the inevitable period of stagnation, if not of actual decline, has already commenced.

As this table indicates, Japan has improved her position in the world by increasing her percentage from 3·9 in 1914 to 5·9 in 1922 although the increase in the last year is relatively small. The same comment might also be made in the case of Holland and Italy, while practically the same amount of tonnage is held in Scandinavian countries to-day, but the percentage has declined as compared with pre-war times.

America's Difficulties.

It may be as well to go further into the vexed question of the position of the United States. In response to the obvious and crying needs of the Allies, and with the laudable wish to impose as little added burden as possible upon their mercantile resources, upon her entrance into the war America embarked upon a shipbuilding programme without precedent in the world's history. The story of her epic achievements is one of gigantic effort, carried forward without regard to cost; * but the cold light of history will ultimately reveal America's war-time shipbuilding, stripped of its cloak of sentiment, as a force almost as unsettling in its effects upon world mercantile conditions as Germany's intense and barbarous submarine campaign of destruction.

That America should desire to retain the vast fleet which her war programme had given her, was only to be expected. But the past year has been one in which, as a result of the world-wide shipping slump, the American shipping industry has been led, however reluctantly and however erroneously, to conclude that its fleet cannot compete unaided with the fleets of countries with several centuries of experience.

Proposed Subsidies.

Against every teaching of economic history, the United States shipping interests are endeavouring to create and maintain a subsidised fleet. As early as December last there were rumours that President Harding proposed to recommend a subsidy for the United States merchant marine, and that the proposal had the support of Mr. Albert D. Lasker, Chairman of the United States Shipping Board.

Definite proposals were duly put forward, providing for aid amounting to over 30,000,000 dollars annually, to be obtained by the diversion of 10 per cent. of the Customs receipts, and by doubling tonnage taxes and adding all the receipts to the Subsidy Fund. A construction fund amounting to 125,000,000 dollars was to be created, from which loans were to be made at 2 per cent. A further fund, expected to total 3,000,000 dollars per annum, was to be obtained by appropriating all port and lighterage revenues, and this money it was proposed to use to create a Merchant Marine Naval Reserve of 5,000 officers and 30,000 men.

The direct aid proposed was to be based on 0·5 per cent. for each gross ton of any approved vessel, regardless of speed, for every 100 miles travelled. In addition, allowances for speed were suggested, as given below :—

13 knots	two-tenths of a cent per gross ton.
14 ,, ...	three-tenths ,, ,, ,,
15 ,, ...	four-tenths ,, ,, ,,
16 ,, ...	five-tenths ,, ,, ,,
17 ,, ...	seven-tenths ,, ,, ,,
18 ,, ...	nine-tenths ,, ,, ,,
19 ,, ...	eleven-tenths ,, ,, ,,
20 ,, ...	thirteen-tenths ,, ,, ,,
23 ,, ...	twenty-six-tenths (maximum) of a cent per gross ton.

* See the "Annual" for 1920–21.

Furthermore, the Bill provided for a requirement that not more than 50 per cent. of immigrants to the United States should be carried in foreign vessels; a 5 per cent. rebate on corporation taxes was to be allowed to firms consigning imports and exports in American bottoms; and the Treasury Department was to allow a higher depreciation allowance than formerly in computing the income taxes of shipping companies.

In addition, Government materials and passengers were to be carried in United States ships; the army transport service was to be operated by the Shipping Board; the coastwise restrictive laws were to be extended to include the Philippine Islands; preferential railway rates were to be charged on through shipments in United States ships; the railway systems were to be permitted to own and operate ocean-going steamships; and insurance was to be made available at no greater cost than that paid by vessels under other flags. When profits from the operation of subsidised vessels exceeded 10 per cent., half the excess was to be returned to the Government, up to the amount of the subsidy itself.

The Reception of the Subsidy Proposals.

The Bill containing the subsidy proposals was sponsored by the Shipping Board, which is the greatest rival of the private shipowning community in the country. It is fair to say that the established shipowners realised fully from the first that the amount of State aid which might be forthcoming in the form of a subsidy would not be sufficient to overcome the economic disability in which they found themselves in competition with other countries, and therefore—more particularly as it was proposed that the administration of the subsidy bill should be in the hands of the Shipping Board—they viewed their future position with the greatest concern. Beyond this, public interest at an early stage became seriously divided on the matter, and the fact that the country was faced with a new election in November tended to give to the controversy a party political bias.

As can be readily understood, the great body of American electors have no interest in shipping, but they have before them the disastrous career of the Shipping Board, which has cost the country some 3,000 million dollars for the construction of their vessels, and has expended something over 200 million dollars on their operation during the last three years. It may be said that the present losses on operation and the maintenance of laid-up ships will probably involve the country in a further expenditure of 50 million dollars for the ensuing twelve months, which indicates that the fleet is not yet paying its way.

There are very powerful commercial and political interests at work which are diametrically opposed to the passing of the Bill. The vast body of agricultural opinion in the Middle West strongly resents the proposal to devote so much of the State funds to the needs of a comparatively small industrial interest. An outcry is being raised against the Bill by the supporters of the bonus promised to

men who served in the late war, which has not been paid owing to lack of funds, on the ground that if shipping can be subsidised to the extent of 30 million dollars per annum, the soldiers' bonus can certainly be paid and is a prior claim on the country. Again, the prohibitionists are opposing the measure, and will certainly only support it provided every ship which sails under the American flag is made to conform to the law of the country in regard to prohibition.

In these circumstances it is not surprising to learn that the Bill has met with a stormy reception, and has already been amended in several respects. Whether it will become law in any effective form is a matter of considerable doubt, but those who have studied world economics will agree that such a measure is retrogressive in nature and may possibly make a very bad confusion worse confounded.

Progress of Germany.

Before passing to a discussion of world shipbuilding, it may be of interest to examine the German position in particular. Germany alone among the European countries has not experienced the shipbuilding slump of the past year. The official figures covering the war period have recently been published by the *Kölnische Zeitung* and are as follows :—

1914	440,000	gross tons
1915	201,000	,,
1916	196,000	,,
1917	65,000	,,
1918	38,000	,,
1919	135,000	,,
1920	327,000	,,
1921 (estimated)	1,714,300	,,

The above figures apply solely to merchant vessels. It must be remembered that the German submarine construction programme totalled over 800 ships, half of which were completed (and two hundred destroyed) by the time of the Armistice; the importance of this factor can be gauged by the fact that this total included 68 vessels ranging from 1,100 to 2,175 tons.

Unofficial estimates at the end of May last, placed the total amount of the German merchant fleet at 1,546,000 gross tons, but it will be seen from Table II. on page 193, that the figure of Lloyd's Register of Shipping for June is 1,783,000 tons of steel and iron steam vessels.

On the other hand, during the past year there has been a tendency for contracts both for new ships and for repair work to be given to yards in Holland rather than to German firms, by reason of labour troubles which have been developing in Germany, and also because of the constant and violent fluctuations in the exchange rate for the mark, which has rendered credit arrangements extremely difficult.

The whole question of Germany's position is so involved that

any conclusions as to the position which her mercantile marine may occupy in the world must be very vague and indefinite.

The World's Shipbuilding.

In last year's "Annual" the writer commented on the great increase in the shipbuilding capacity of the world as a result of the war. By 1919, the capacity of the world was approximately 100 per cent. more than in 1913, the highest pre-war year, and though the year 1920 showed a slight reduction in output, this was almost entirely due to the fact that the United States had ceased to build wooden steamers. It was pointed out, also, that an enormous depression lay before the shipbuilding industry. The figures now available for 1921 amply confirm the fears then expressed (if confirmation of a universally known fact were necessary), as will be seen from Table IV.

Table IV.—The World's Shipbuilding, in Millions of Gross Tons.

(As reported to Lloyd's Register of Shipping.)

Country.	1913.	1919.	1920.	1921.
United Kingdom . .	1·932	1·620	2·056	1·538
British Dominions *. .	0·027	0·298	0·174	0·118
British Empire *. . .	1·959	1·918	2·230	1·656
Germany	0·465	?	?	0·509
United States † . . .	0·228	3·040	2·349	0·995
France	0·176	0·033	0·093	0·211
Holland	0·104	0·137	0·183	0·232
Japan	0·064	0·612	0·457	0·227
Austria-Hungary . .	0·062	—	—	—
Italy ‡	0·050	0·083	0·133	0·165
Scandinavia	0·110	0·147	0·164	0 195
Other Countries . . .	0·043	0·079	0·096	0·129
World's Total † . .	3·261	6·049 §	5·705 §	4·319

It now seems probable that the pre-war shipbuilding capacity was approximately sufficient for the world's needs, and that the output for the year 1922 will fall far below the maximum pre-war figure of about three million tons.

It is necessary to emphasise the fact that one of the permanent results of the war may be the distribution not only of the tonnage owned, but also of shipbuilding, upon a new basis. Table V. on the opposite page, shows the share of each country in the world's shipbuilding output in the years 1913, 1919, 1920, and 1921.

* Excludes Canadian Great Lakes vessels.
† Excludes wooden vessels, and American Great Lakes tonnage
‡ Italy now includes Trieste.
§ Excludes Germany and Austria-Hungary.

It will be observed that the proportion built by the British Empire has been reduced from 60 per cent. to 38 per cent., while the United States, which before the war only built 7 per cent., jumped to half the world's output in 1919. Such an incredible expansion must obviously have a very unsettling effect upon the industry as a whole, and it is not surprising to find that the percentage has fallen off rapidly to 23 per cent. in 1921. It is probable that America's share in world shipbuilding will be very much smaller for 1922.

TABLE V.—THE PERCENTAGE OF THE WORLD'S TOTAL AMOUNT OF TONNAGE BUILT IN THE PRINCIPAL SHIPBUILDING COUNTRIES.

(See footnotes to Table IV. on p. 198.)

Country.	1913.	1919.	1920.	1921.
United Kingdom	59·2	26·8	36·0	35·7
British Dominions	0·8	4·9	3·1	2·7
British Empire	60·0	31·7	39·1	38·4
Germany	14·3	?	?	11·8
United States	7·0	50·3	41·2	23·0
France	5·4	0·5	1·6	4·9
Holland	3·2	2·3	3·2	5·4
Japan	2·0	10·1	8·0	5·2
Austria-Hungary	1·9	—	—	—
Italy	1·5	1·4	2·3	3·8
Scandinavia	3·4	2·4	2·9	4·5
Other Countries	1·3	1·3	1·7	3·0
	100·0	100·0	100·0	100·0

THE EFFECTS OF THE SLUMP.

It seems desirable to recur in this article to the question raised in last year's "Annual" of the amount of tonnage under construction, commenced, and launched. The stability and prosperity of the shipbuilding industry depend upon a proper relation being maintained between these three factors, and in the world position of to-day, a study of Table VI. on page 200, which is the continuation of one given last year, will be of interest.

This table illustrates with considerable clearness the disastrous nature of the slump in shipbuilding. In September, 1919, over 8 million tons of merchant shipping were under construction; by June of this year the amount had fallen to 3¼ millions—less than half. The tonnage launched per quarter, however, dropped from 2 millions in December, 1919, to less than 400,000 tons in June, 1922. Such a contraction is entirely unprecedented, even in an industry which is subject to such wide variations between prosperity and depression as shipbuilding is. Of more importance still is the fact that the tonnage commenced in each quarter has dropped from 1¾ millions in December, 1919, to 118,000 tons in March, 1922; in other words, the new work coming into the shipyards of the world had fallen at

the beginning of this year to only seven per cent. of the figure for the end of 1919.

It is obvious that under such circumstances the method of estimation given in the article last year will not be applicable, since it rests to a large extent upon the maintenance of a fairly even rate of construction. That method, applied to the year 1922, yields a total of 2·4 million tons of ships built for the year. The continuation of the curve obtained by plotting the launchings per quarter, however, gives the figure as 1·5 million tons, which appears to be a far more correct estimate, in view of the fact that only 913,000 tons have been launched in the first half of this year. The most valuable method of estimation, however, appears to be given by the figures of tonnage commenced. If these figures are taken direct, with a suitable "lag"

TABLE VI.—SHIPBUILDING, IN MILLIONS OF GROSS TONS.*

(See also Table VII.)

Quarter ended.	United Kingdom.			Other Countries.			Total.		
	Under construction.	Commenced.	Launched.	Under construction.	Commenced.	Launched.	Under construction.	Commenced.	Launched.
Sept. 30, 1919	2·317	—	0·614	5·232	—	1·371	8·049	—	1·787
Dec. 31, 1919	2·994	0·604	0·459	4·867	1·150	1·582	7·861	1·754	2·041
Mar. 31, 1920	3·394	0·708	0·454	4·548	1·000	0·882	7·942	1·708	1·336
June 30, 1920	3·578	0·588	0·523	4·143	0·796	1·022	7·721	1·384	1·545
Sept. 30, 1920	3·731	0·594	0·483	3·834	0·788	1·005	7·565	1·382	1·488
Dec. 31, 1920	3·709	0·506	0·580	3·471	0·720	0·897	7·180	1·226	1·477
Mar. 31, 1921	3·799	0·393	0·433	3·288	0·462	0·622	7·087	0·855	1·055
June 30, 1921	3·530	0·069	0·321	2·669	0·178	0·686	6·199	0·247	1·007
Sept. 30, 1921	3·283	0·051	0·308	2·260	0·265	0·539	5·543	0·316	0·847
Dec. 31, 1921	2·640	0·055	0·467	1·817	0·091	0·428	4·457	0·146	0·895
Mar. 31, 1922	2·236	0·051	0·304	1·444	0·067	0·189	3·680	0·118	0·523
June 30, 1922	1·919	0·039	0·149	1·316	0·112	0·241	3·235	0·151	0·390

to allow for the period of construction, it will be found that they provide an estimate which is very close to the actual figure. It may be mentioned that for the year 1922 this estimate, at nine months' "lag," is 1·54 million tons, and at twelve months' "lag" 1·57 million tons, both of which agree very closely with the estimate obtained from the curve of launchings.

It must be remembered, however, that the tonnage under construction as shown in Table VI. is not the amount upon which work is actually proceeding. Before the war it may be said that only a negligible amount of tonnage was ever left on the stocks idle and uncompleted, except for very short periods. It has been one of the worst features of the present shipbuilding depression that a large number of berths have been occupied for many months by incomplete vessels, upon which work has been suspended. This particular phase

* This table does not include tonnage under construction in Germany and Danzig, which, for the quarter ended June 30, 1922, is estimated to be about 500,000 and 45,000 tons, respectively.

of the slump first began to assume importance before March of last year, and reached its maximum in December last, when over 25 per cent. of the tonnage recorded by Lloyd's Register as "Under Construction" in the world was suspended. Table VII. records the variations in suspended construction; it is the first sign of returning prosperity that this dead weight of unfinished shipping is slowly being removed. The amount suspended has dropped from 1,122,000 tons at the maximum to 771,000 tons in June, 1922, and there is every prospect of this amount being gradually worked off during 1922 and 1923.

TABLE VII.—SUSPENDED CONSTRUCTION.

(Millions of Gross Tons.)

Quarter ended.	United Kingdom.			Other Countries.			Total.		
	Under construction.	Suspended.	Actually under construction.	Under construction.	Suspended.	Actually under construction.	Under construction.	Suspended.	Actually under construction.
Mar. 31, 1921	3·799	0·497	3·302	3·288	*	3·288	7·087	0·487	6·590
June 30, 1921	3·530	0·735	2·795	2·669	*	2·669	6·199	0·735	5·464
Sept. 30, 1921	3·283	0·731	2·552	2·260	0·375	1·885	5·543	1·106	4·437
Dec. 31, 1921	2·640	0·722	1·918	1·817	0·400	1·417	4·457	1·122	3·335
Mar. 31, 1922	2·236	0·617	1·619	1·444	0·325	1·119	3·680	0·942	2·738
June 30, 1922	1·919	0·481	1·438	1·316	0·290	1·026	3·235	0·771	2·464

It is also to be noted that the figures for tonnage broken up, which will be found on page 203, show a very marked increase for the year 1921, when over 93,000 tons were disposed of as compared with an average of about 10,000 tons for the previous five years.

The slight increase in the tonnage commenced, from 118,000 tons in March of this year to 151,000 tons in June, is also significant, and this increase, in turn, will affect the curve of launchings, which will probably reach a minimum about the end of the year, and thereafter rise in sympathy with the curve of commencements.

From all points of view it would appear that the end of the worst period of depression that world shipbuilding has ever known is in sight, though recovery will doubtless be a long and painful process.

EFFICIENCY OF THE MERCANTILE FLEETS.

Apart from the possible change in the basis of distribution of world tonnage as a result of the war, it is of importance to see in what way the efficiency of the vessels composing the fleets has been affected. A gross total of over 12,600,000 tons of merchant shipping was lost by direct war risks during the late war, and yet the amount of tonnage possessed by the world, as we have seen, has increased. It would appear to be a reasonable assumption that the replacement tonnage, built at high speed, largely to standard type, and by labour

* The amount of tonnage building abroad upon which work was suspended during these two quarters is not definitely known, but is estimated to be negligible.

which was not highly skilled in shipbuilding, would not be so efficient as the tonnage lost.

It may be said at once, however, that from a detailed investigation undertaken by the writer in the earlier part of 1922,* it would appear that the average age of the British mercantile fleet has remained approximately unaltered. Obviously, Great Britain was the country which was most exposed to, and which suffered most from, the attacks upon commerce during the war, and it may therefore, perhaps, be fairly argued that the age of the world's merchant fleet, as a whole, has not been materially affected.

Whether, however, the efficiency is the same, is entirely another question. The world's fleet to-day includes at least 1½ million tons of wooden war-built vessels, now laid up, which it is extremely unlikely will be taken into service again. Moreover, Mr. A. D. Lasker, the President of the American Shipping Board, admitted in April, 1922, that at least 3,000,000 tons of the U.S.S.B. fleet was "fair to useless"; it is probable that at least 4,000,000 tons of American tonnage is still laid up, and of this 3,000,000 tons is utterly unsuitable for post-war conditions. It was recently reported, for instance, that in the Hudson River there are seven miles of idle vessels, several abreast, while conditions in the James River, at Newport News, are even worse.

It was estimated last year that approximately 20 per cent. of the world's fleet was idle. Roughly 2½ to 3 million tons of shipping were laid up in British ports, exclusive of tonnage tied up on account of the disastrous coal strike of last summer. Figures collected by the Chamber of Shipping of the United Kingdom gave the total as 1,852,000 tons, but from other sources this would appear to be an under-statement. The comparative figure for July 1, 1922, however, is 1,112,000 tons, and it may be assumed that approximately 10 million tons of world shipping is still laid up.

Cost of Idle Tonnage.

The effect of this idle tonnage upon the average efficiency of the world's fleet cannot but be considerable. A 6,000-ton cargo steamer is subject to charges amounting to about £10 per day when laid up at moorings, quite apart from interest on the capital value, insurance, and depreciation. Thus the 10,000,000 tons laid up represents, in addition to possibly £100,000,000 idle capital, an expenditure of at least 6 to 8 per cent. per annum. Furthermore, depreciation proceeds at a very much higher rate when vessels are laid up than when they are in service, and the effect of laying up on the utility of the tonnage and upon the length of economic life of the vessels, must be very marked.

Moreover, the presence of this large amount of idle tonnage in the world renders the recovery of world trade a very much slower and more difficult process than it otherwise might be. When freights tend to rise, the natural and invincible optimism of shipowners renders it almost inevitable that more laid-up tonnage should be

* See article on "The Merchant Navies of Yesterday and To-day." *Manchester Guardian*, "Reconstruction in Europe," Section Two, May 18, 1922.

replaced in service than is justified by the amount of increased trade which instigated the slight upward freight movement. The immediate result, of course, is that freights fall again, possibly to an even lower level, so that still more tonnage is thrown out of employment.

In this connection it is illuminating to study the figures of marine losses. For the twelve years before the war, the average percentage of the world's steam and motor tonnage totally lost by sea risks was 1·24. This percentage, for the three available post-war years, is :—

Year.	Tonnage owned.*	Tonnage lost.	Percentage.
1919	47,897	515	1·12
1920	53,905	511	0·99
1921	58,846	459	0·81

(Thousands of gross tons)

Now it is well known that risks at sea have *not* decreased since the war, but, if anything, have increased, for casualties arising from drifting mines and other after-effects of the war are included in the above figures. The apparent decrease, then, can only come about because a smaller fleet is actually in service, and thus the exposure to risk is lessened.

Assuming marine risks to be the same as in pre-war days, it is possible from the above figures to calculate the approximate amount of tonnage actually in employment, and the amount laid up. The estimated figures are as follow :—

Year.	Tonnage owned.	Tonnage employed.	Tonnage laid up.
1919	47,897	43,262	4,835
1920	53,905	43,037	10,868
1921	58,846	38,440	20,405

(Thousands of gross tons)

This assumes, however, that the pre-war efficiency of carrying power per ship has been maintained. Actually, of course, vessels have been sailing with very light holds, and for a first approximation it will be sufficiently accurate, as a conservative estimate, to assume half the above figures to be correct. The tonnage laid up then becomes :—

1919	2,417,000 gross tons.
1920	5,434,000 ,,
1921	10,202,000 ,,

Of more consequence still is the fact that during and since the war the amount of tonnage broken up by reason of old age and obsolescence has decreased very considerably. The figures are given below :—

	Gross tons.
1901	109,977
1906	200,292
1911	255,517
1914	128,978
1915	48,773
1916	11,114
1917	10,040
1918	3,028
1919	12,351
1920	11,951
1921	93,431

* At June of the year in question.

Before the war, an average of 0·45 per cent. of the world's fleet of merchant vessels was broken up annually. For the eight years, 1914 to 1921 inclusive, however, only 0·06 per cent. per annum was similarly disposed of. It is natural to expect that the pre-war percentage would at least be maintained, since the German submarine campaign was to a large extent selective in character, and it was the best and most modern vessels, as a rule, which were lost. From various causes, however, an average of 0·39 per cent. per annum has been retained in service—a total for the eight years of over a million and a half tons.

It will be obvious, therefore, that the average efficiency of the world's merchant fleet must be considerably reduced, as compared with the pre-war standard, both on account of the rapid deterioration of laid-up vessels, and the retention of this large amount of normally obsolete tonnage. It is also to be noted that recent developments in design and motive power have considerably shortened the economic life of the older type of cargo-carrier. In all probability, about three million tons of war-built vessels, a million or more tons of normally obsolete ships, and a million tons which have become obsolete owing to the recent developments, will have to be disposed of before the world's fleet approximates to the pre-war standard of efficiency.

Growth of International Understanding.

It might seem to the ordinary observer that even before the war there was some uniformity of practice in regard to all shipping matters. For example, it might be said, and fairly truly, that the freeboard regulations of most of the maritime countries had been brought more or less into line, and it might also be said that the tonnage regulations for all bodies, other than canal authorities, were also in close agreement. But further inquiry would reveal the fact that such agreement had been brought about, not by the deliberate desire of the members of the international shipping community to agree on a common basis of law, but rather because the various national regulations dealing with necessary restrictions of commerce had clashed with international requirements.

Every maritime country of importance had laid down certain specific requirements for the registration, for the measurement, and for the loading of ships which had as their basis the national law of the country, with the consequence that such documents were not easily suitable for that international interpretation which free sea intercourse necessarily requires. Whatever be the reason, it has become obvious to all engaged in shipping that enormous improvement has taken place in international understanding in the last few years. It may have arisen because of the necessity of working together during the war; it may have arisen because the maritime world realised that Great Britain had respected the rights of individuals at sea; but it has also been fostered by the international work of Lloyd's Register of Shipping. That Society, by wise administration and impartial authority, has established such a position

in the world that, in pre-war days, practically two-thirds of the sea-going tonnage was constructed under its ægis.

It had become apparent, even before the war, that in order to give fair representation to the interests of other countries it would be necessary in some way to extend the organisation of Lloyd's Register to include some form of international representation. It may be remarked that even in Great Britain it was found desirable that there should be branch committees at the important shipping centres, namely at Liverpool and Glasgow. It would therefore appear that the policy of establishing branch organisations outside the United Kingdom was a natural method of development, and accordingly the first step to this end was taken in February, 1916, by the formation of the American Committee with headquarters in New York. The constitution of this Committee was on the same lines as the General Committee in London, *i.e.* it embraced representatives of underwriters, shipowners, shipbuilders and marine engineers, and particular care was taken to include as many as possible of the most representative men of the industry.

The exigencies of the war prevented further activities in this direction, and accordingly it was not until shortly after the Armistice that any considerable further development was possible. The French Committee was founded in January, 1920; the Sweden Committee in March, 1920; the Japan Committee in April, 1921; and the Holland Committee in June, 1921. These Committees were of the same nature and character as the other branches, and the association of so many distinguished members of the shipping industry within the organisation of Lloyd's Register must have led to a greater degree of understanding and a greater possibility of sympathetic co-operation in world affairs.

By this arrangement, over 200 members of the maritime communities of the world are linked together in an organisation which has for its object the co-relation of the restrictions necessarily placed on ships for the safeguarding of life and property at sea. Further than this, the Chairmen of the Branch Committees in various countries are *ex officio* members of the General Committee in London, while each country has also a special technical representative to deal with all matters which involve changes in the rules and regulations of the Society.

Lloyd's Register took a further step forward in April, 1922, by bringing about a working accord with an old established classification society which has operated in Italy for many years. It will have been noticed that, at the instigation of the Italian Government, the Registro Navale Italiano and the Veritas Adriatico, which had its headquarters at Trieste, were fused into one institution under the name of the Registro Italiano, and it seemed desirable to all parties concerned that there should be some agreement so that Italian shipowners, while securing the national classification of their vessels, should be able to obtain the advantages of the world-wide classification of Lloyd's Register with as little inconvenience as possible. Thus was a further link formed for the interchange of international views, and it may be anticipated that in process of time the pioneer

action already taken will be extended so that the whole maritime community will be bound together in bonds of mutual interest working for unanimity and uniformity of maritime law at sea.

One of the great advantages of this international co-operation has been witnessed in the issue by Lloyd's Register of its new Rules for the Construction of Steel Vessels, which were finally adopted in July, 1922. For the first time in history, the requirements were subjected to the criticism of these Committees and their representatives.

The International Shipping Conference.

But in addition to this development, a striking departure has resulted from the co-operative spirit which grew up as the result of war necessity, and which in itself forms a striking contrast to the growth of the nationalist spirit which for various reasons was fostered in many countries. At the request of other countries, the Chamber of Shipping of the United Kingdom, in conjunction with the Liverpool Steamship Owners' Association, called together a conference of shipowners which met in London on November 23, 1921, and subsequent days. The questions which were brought before the conference were very far reaching in character. They dealt with such matters as documentary agreement, uniformity of maritime laws, the Hague Rules, and taxation of shipping—work in which the International Law Association and the Comité Maritime International had alone been interested in pre-war days. The point of view of the conference was that shipowners themselves could, with best advantage, discuss the problems they had to face, but it was agreed that they should be assisted in every respect by technical advisers of all kinds.

It is not the purpose of this chapter to deal with the legal side of maritime commerce, or to discuss the various documents which are necessary for the movement of ships, but particular attention might be drawn to some of the other matters which came before the International Conference which deal more particularly with the ship herself—such matters being the question of carriage of deck cargoes, which has been the subject of very vexed dispute for many years, and the load-line of cargo vessels, upon which question there was considerable agreement before the war, although there were many points which were considered to have been dealt with more nationally than the case appeared to require. There was, further, the difficult interpretation of the requirements of the Convention of 1914 which dealt with the subdivision of passenger vessels, with the question of life-saving appliances, and with the requirements for wireless telegraphy. This Convention, which arose from the Titanic disaster, laid down in great detail international regulations for all these matters; but the Convention itself was not complete, the interpretation of many clauses was still very vague, and the only country in which the Convention had been even partially administered was Great Britain. The incidence of the war put a stop to the subsequent investigation which was required to make the Convention

workable, and, more than that, the experience gained during the war seemed to make it clear to all concerned that the operation of quite a few of the requirements of the Convention was unnecessarily restrictive. Moreover, the enormous development that has taken place in wireless telegraphy, and the decision of the British Government that all vessels over a certain size should be fitted with wireless apparatus, made it desirable to review almost entirely the work of the Convention, chapter and verse.

There was again a further point which it is more or less admitted the Convention did not take sufficiently into account, and that is the fact that restrictive legislation must of necessity be examined in the light of economic possibilities. If the legislation is too severe, vessels will not be built, but no legislation on earth will prevent passengers from travelling; and unless therefore a fair balance is struck between restriction and economics, the compliance with the law may result in a worse state of affairs than if there had been no law, because after all every shipping community has realised, and continues to realise, that it has a very deep duty to the community to safeguard property and life to the greatest possible extent which the economic conditions warrant.

This economic question is of greater importance to-day than it was in pre-war times. Although it may be argued that the Convention requirements would have been more or less practicable if the conditions of the early part of this century had been maintained, yet while to-day some of the passenger vessels built since the war have cost four times as much as similar vessels of previous construction, it has not been found practicable, except in extreme cases, to increase passenger fares to more than about twice pre-war rates.

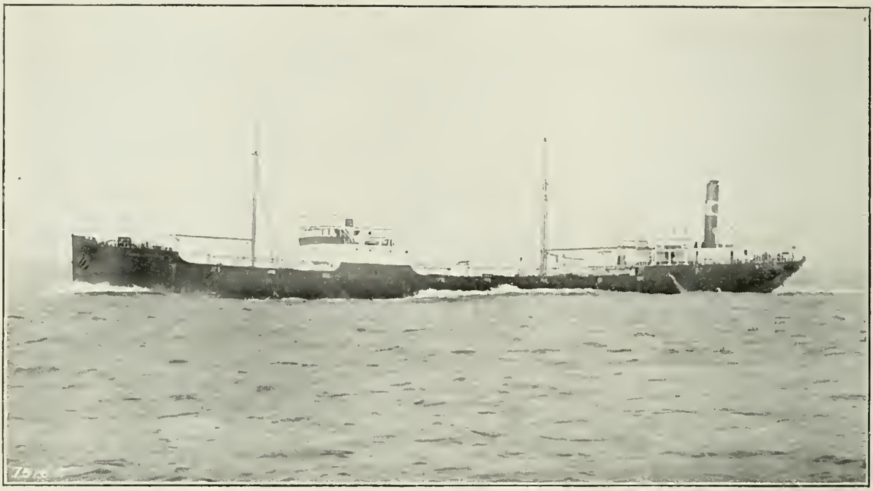
As a result of these views, the International Conference of Shipowners set to work to form sub-committees which would deal in detail with these various questions. The first step taken towards this end was the holding of a Committee meeting in Christiania to consider the question of deck cargoes. This meeting was attended by representatives of all the Northern European nations, and detailed regulations were drawn up for the carriage of deck cargoes of light wood goods. The regulations so drawn up have been submitted by the various national associations to their respective Governments and the attitude of some of these has already been obtained. It is rather a difficult matter to effect an alteration in the old standing British law on the subject, but it is known that the British Government are giving very close attention to the matter. Further than this, meetings of various sub-committees were held in London in May last which dealt with the question of subdivision of passenger ships, life-saving appliances, and wireless telegraphy, as well as cargo load line. All these sub-committees have made unanimous reports as to what can reasonably be done, and these reports have been transmitted to the various Governments.

It is not a little remarkable that representatives of thirteen countries, including British colonies, can come together and, actuated by their mutual interests, draw up a series of agreements to which they can give unqualified support. It is rather early to say that the fruit

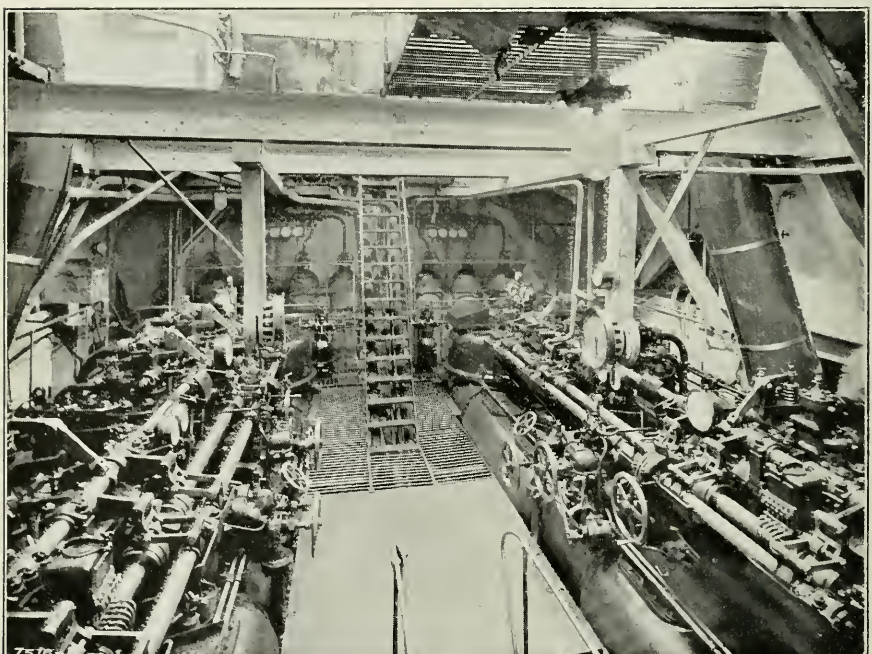
of this work will be reaped immediately, but it is to be hoped that the beginning of the year 1923 will see many of the anomalies, which have existed for years past in the regulations, brought to a common basis to the mutual advantage of every one engaged in overseas trade.

The essence of all this work is that nationality is of no importance to a ship caught in a winter gale; it is the fitness of the vessel which is all important.

WESTCOTT ABELL.



MOTOR SHIP CONDE DE CHURRUCA.
Built and engined by Messrs. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.



MAIN ENGINES OF M.S. CONDE DE CHURRUCA. TOP PLATFORM SHOWING MANŒUVRING GEAR.

CHAPTER II.

The Freight Depression.

Anything worse than the state of the shipping trade in 1921 was not within the power of shipowners to conceive. Judged by every accepted standard and in the light of long experience, shipowners were justified in believing that if 1921 did not register low-water mark in the severest depression which the shipping trade has ever experienced, disaster must follow. Nevertheless, it has been reserved for 1922 to plumb a still lower depth of freight depression. It is a fact which the present survey will make abundantly clear, that freights have fallen below, and considerably below, the limits of 1921, notwithstanding a marked movement in outward coal business and, at times, fair activity in grain chartering; and it is but truth that the shipping industry has only been saved from the gravest financial loss by some reduction in working costs, due to lower wages, reduced dock and port charges and cheaper bunkering fuel. It is a fact, too, that in the case of many of the large companies, such dividends as have been paid to the shareholders have been earned not so much out of freights as out of interest on accumulated investments.

That things should have come to this pass during a year which, bad enough as it has been in the mass, has yet seen the first signs of improvement in world trade, reveals a condition of the shipping industry which cannot be regarded as other than exceptional, if not unique. In the main, it may be said that international trade has improved but that freights have not. Shipping, usually so sensitive to the slightest movement in the trade barometer, has failed to respond. Why? Simply because the industry is burdened with over-much tonnage. It has come to be recognised by the most competent authorities that shipping is suffering not only from a world-wide restriction in trade, but from an excess of tonnage far beyond the world's needs.

Too Much Shipping: Too Little Trade.

In the course of his very able review of the position last year, Sir William J. Noble said in these pages: "While the carrying tonnage afloat exceeds the pre-war quantity by eleven million tons, the quantity of world trade reckoned in tonnage is much below the pre-war level, and consequently these eleven millions count as excess tonnage which world trade, for the time being, cannot absorb. It is this position which is the direct cause of the freight depression. The remedy is obvious. Only improvement in world trade can restore the balance." There could have been no sounder summing

up of the situation at the time than this: it went to the root of the matter. Sir Thomas Royden has since clinched it in the phrase that shipping is suffering from "a slump largely caused by over-production of ships and under-production of commodities to carry in those ships, both a direct effect of the recent Great War."

Speaking within the limits of the year, the fact is that though world trade has improved a little, the shipping industry has been unable to participate in the improvement because of a further increase in the excess of tonnage, and, in this respect, the situation to-day is a stage worse than that so accurately described by Sir William Noble over twelve months ago. In a word, Sir William's 11 million tons excess in 1921 has grown to 14 million tons in 1922 as Sir Frederick Lewis has pointed out. There is the fundamental fact of the shipping position. There lies the cause of most of the trouble. It accounts for all that has happened during the year, for the further fall in freights, for still lower shipping values, for the stagnation in shipbuilding and, finally, for the hysterical efforts of certain countries to make a national preserve of their carrying trade at all cost.

The Excess of World Shipping.

For the sake of precision, it may be well to confirm the calculations of these gentlemen by referring to the indisputable authority of Lloyd's Register Statistical Tables for 1921–22. The increase of tonnage of the 1914 total was 11,703,000 tons last year and on the 1921 total is 2,585,000 tons this year, or together 14,288,000 tons. If, therefore, shipping was severely handicapped in 1921 with a surplus tonnage of about 12 millions compared with pre-war, it must clearly be in worse case in 1922 with an excess of tonnage increased to $14\frac{1}{4}$ millions, a slight improvement in world trade notwithstanding. Even shipbuilding at the reduced pace of the past year has been too much for the over-burdened freight markets. From a market point of view, if there could have been a total cessation in shipbuilding for twelve months, it would have brought real relief. This being impracticable and not to be desired from the standpoint of efficiency, the only alternative is to scrap the undue proportion of obsolete vessels now afloat as fast as possible, and, incidentally, that is a task which will have to be undertaken on a larger scale than has yet been attempted.

In passing, there is surely no need to reiterate at this time of day, that this large excess of tonnage is due mainly to the war effort of America, which country, within four or five years, converted a mercantile fleet of under 2 million tons into one of $12\frac{1}{2}$ million tons. Twelve months ago, the excess of tonnage was roughly just about the amount which the United States had added to her fleet, and, though this excess has been increased to $14\frac{1}{4}$ million tons by the accumulated additions of other countries to their carrying power, the basic fact remains that it is to America's policy of continuing to build after the necessity for it had passed that the freight markets to-day are so much overburdened with tonnage and that so many vessels are lying idle for want of employment.

Keeping in mind this large excess of tonnage as the key to the situation, let us see how far overseas trade has improved. Now statistics of world trade are not easy to arrive at, but the Board of Trade Returns attest a considerable expansion in British imports and exports during the year, and so do the statistics of the Port of London, while so far as shipping is concerned, we have the monthly records of entrances and clearances into and from British ports, and these serve as a fair index to trade movement. Taking the figures for the eight months of the year to August, and comparing them with the same period of last year and 1920, we arrive at the result given in Table I.:—

TABLE I.—TONNAGE OF VESSELS ENTERED AND CLEARED FROM BRITISH PORTS.

	Entered (with cargoes).			Cleared (with cargoes).		
	British.	Foreign.	Total.	British.	Foreign.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Eight months ended August, 1922 . . .	18,542,932	9,448,168	27,991,100	23,513,927	14,044,827	37,558,754
Increase compared with eight months ended August, 1921 . . .	+2,092,056	+1,800,022	+3,892,078	+9,598,601	+7,674,256	+17,272,857
Increase compared with eight months ended August, 1920 . . .	+1,527,104	+2,711,006	+4,238,110	+8,125,188	+4,819,643	+12,944,831

The increases, it will be seen, are unmistakable. They point to the fact that there has been more employment for shipping than in the previous two years, but it is evidently not sufficient to absorb any substantial proportion of the increased excess of tonnage. As to foreign trade we are entitled to draw the same conclusion from the returns of the two great connecting waterways—the Suez Canal and the Panama Canal—which, in both cases, indicate increased traffic. It is not pressing the case too hard to say that, in spite of the troubles on the Continent and the demoralisation of many of the exchanges, there has been more movement of goods, notably perhaps to and from the United States and from and to Europe and the East.

However this increased movement may be estimated, we have to face the fact that it has been wholly insufficient to employ the shipping available, as the large quantity of laid-up tonnage attests. Here again we must be content with the statistics which apply to our country. According to the Chamber of Shipping Returns, which have been published in "Lloyd's List," the number and net tonnage of vessels laid up in United Kingdom ports on the dates indicated were as follows:—

Date.	Vessels.	Net tonnage.
July 1, 1921 . . .	723	1,852,412
January 1, 1922 . .	712	1,307,593
April 1, 1922 . . .	484	836,619
July 1, 1922 . . .	582	1,111,562

These figures show what we should expect to find, viz., that increased employment for tonnage in 1922 has had some effect in reducing the number of idle ships, but not nearly as much as was hoped for, while after the marked reduction recorded on April 1, there was, unfortunately, a return of disappointing freight market conditions and a consequent increase in idle shipping. The 1,111,562 net tons returned for July 1 represent about 2½ million tons d.w. carrying capacity of shipping. In the United States the laid-up shipping was known to have been nearly double this figure before a number of Shipping Board vessels were fixed to carry coal from England, and if we add the vessels tied up at European and other foreign ports, it is not far wide of the mark to estimate that 8 to 9 million d.w. tons of world shipping have been out of commission this year for want of freights.

The Chief Trade Movements.

In the light of these facts and figures, let us now see what have been the chief oversea trade movements of the year and to what extent freights have been affected thereby. The expansion in outward coal business, accentuated by the American demand during the long continued strikes in the American coal-fields, will be at once recalled as the chief of these movements. In volume, at least, outward coal business has been good and, at times, during the height of the American boom, really active. Generally speaking, this outward movement had the effect of scattering tonnage over a wide area and during the summer and autumn of diverting an unduly large amount of carrying power to the other side of the Atlantic. The result was that the homeward markets had tonnage in plenty at command and grain, cotton, lumber, and sugar shippers were able to charter on easy terms, a privilege of which they took full advantage to bear down rates of freight in their favour. This was especially the case in the Canadian, United States, and Argentine markets, in all of which homeward rates fell to very low figures. Thus the advantage accruing from outward coal freights was annulled by greatly reduced homeward freights, and steamers' results on the round voyage in the Western trades were, for the most part, very unsatisfactory.

In other directions, there were no marked features. Sugar from Cuba absorbed rather more tonnage than in the previous year. Nitrate freight showed some life towards the autumn. The North Pacific trade *via* the Panama Canal offered somewhat increased employment for a time, and has, no doubt, great possibilities of development. The Danube market, after a long spell of stagnation, was reopened, but failed to sustain its first promise. Iron ore freights were little better than negligible until the British iron trade began to recover late in the autumn. Black Sea grain business was, of course, a dead letter. All the Eastern markets, from Alexandria to Australia, found a poor demand for tonnage and proved to be wholly disappointing, with the exception, perhaps, of the Rice ports, which have increased shipments to their credit. Australia, whose grain shipments were such a feature in 1921, had less to send in

1922, and the liners got much of the cargo offered. Baltic wood business showed signs of expanding, but shipments were considerably interrupted by exchange difficulties and by diversion of large tonnage into the American trade, and it was only towards the close of the season that chartering moved with any freedom. Except for coal and pig iron to Germany and Belgium, the coasting and nearer Continental trades excited little interest and owners of small vessels had a bad time. Even oil tanker freights, which in previous years had maintained a certain exceptional activity of their own, fared no better than other sections of the market because the increasing supply of boats at command led to such a pronounced fall in rates that owners, in many cases, found it preferable to lay up their vessels. Of time chartering, usually regarded as the surest index of the freight markets, there is nothing better to say than that it has been dull and featureless at rates which rank amongst the lowest on record for many years.

The Downward Course of Freights.

The actual decline in freights will be seen from Table II. on pages 214 and 215, which has been prepared from the monthly records of *The Compendium*, and shows the highest, lowest, and mean rates over 1920, 1921, and 1922 to September, in representative markets. A perusal of this table will reveal the facts that in outward coal freights, in spite of the increased business which has distinguished the year, the mean rates of 1922 are in every instance below the mean of 1921, and that, as a rule, the decline is very marked; that in the homeward markets, with the exception only of Bilbao ore freights, the mean rates are also much below the mean rates of 1921, while the lowest rates of the year compared with the mean of 1920, in the main justify Sir Frederick Lewis's conclusion that freights are, on the average, only about one-fifth of those ruling in that year. In time-charter rates, for example, the lowest for twelve months' general trade this year is 4*s.*, which compares with a mean of 18*s.* 9*d.* for 1920. In the Montreal grain trade the lowest rate this year, 3*s.* per quarter, compares with a mean of 11*s.* 9*d.* for 1920; in the Gulf trade 3*s.* 3*d.* per quarter with 12*s.* 10½*d.* in that year; and the River Plate 19*s.* 3*d.* with 125*s.* In the Eastern markets, Calcutta at 26*s.* 3*d.* compares with 138*s.* 9*d.*; the Rice ports at 23*s.* 9*d.* with 127*s.* 6*d.*; Java (sugar) at 30*s.* with 135*s.*; Australia at 35*s.* with 112*s.* 6*d.*; and, to take a representative Baltic wood freight, Sundsvall to East Coast, this year's lowest rate of 42*s.* 6*d.* compares with a mean of 175*s.* in 1920. But these comparisons, it will be noted, are tame in contrast with the highest rates which ruled during the war period. From that height to the present depth is, indeed, a precipitous descent!

Index Numbers.

Turning from the actual rates of freight to the index numbers compiled for the Chamber of Shipping by Dr. L. Isserlis, we not only get general confirmation of this decline, but the whole are

TABLE II.—HIGHEST, LOWEST AND MEAN FREIGHT RATES, 1920, 1921 AND 1922.

Ports.	Highest war period freight.	1920. Highest rate.	1920. Lowest rate.	1920. Mean.	1921. Highest rate.	1921. Lowest rate.	1921. Mean.	1922 (to September). Highest rate.	1922 (to September). Lowest rate.	1922 (to September). Mean.
COAL FREIGHTS—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cardiff to River Plate	150 0	75 0	22 6	48 9	22 6	13 6	18 0	19 6	13 3	16 4½
,, Alexandria	140 0	82 6	20 0	51 3	27 6	14 3	20 10½	17 0	12 0	14 6
,, Las Palmas	56 3	38 9	17 6	28 1½	13 0	11 0	12 0	12 6	9 6	11 0
,, St. Vincent	63 9	40 0	18 9	29 4½	14 0	11 3	12 7½	12 3	10 0	11 1½
,, Barcelona	440 0*	67 6	20 0	43 9	21 9	14 0	17 10½	16 0	13 6	14 9
,, Gibraltar	100 0	52 6	12 6	32 6	13 6	9 0	11 3	12 0	9 0	10 6
,, Lisbon	100 0	50 6	17 0	33 9	16 6	10 7½	13 6¾	13 0	9 6	11 3
,, Rouen	48 9*	72 6	12 0	42 3	10 0	5 9	7 10½	8 6	5 7½	7 0¾
,, Havre	48 9*	60 0	12 0	36 0	9 6	5 6	7 6	7 6	4 9	6 1½
,, U.S.	—	—	—	—	—	—	—	16 0	7 6	11 9
,, Montreal	—	—	—	—	—	—	—	14 0	7 6	10 9
,, Libau	—	—	—	—	—	—	—	8 6	8 1½	8 3¾
Tyne to Port Said	200 0	75 0	17 6	46 3	17 6	12 6	15 0	16 6	12 0	14 3
,, Genoa	100 0	87 6	17 6	52 6	22 6	12 3	17 4½	15 6	10 6	13 0
,, Bordeaux	78 0	47 6	10 0	28 9	11 0	8 0	9 6	10 0	6 6	8 3
,, London	21 3	17 0	6 9	11 10½	8 6	5 0	6 9	7 3	3 9	5 6
,, Rouen	53 3*	70 0	10 0	40 0	11 0	5 6	8 3	9 0	4 10½	6 11¼
,, Gothenburg	220 kr.	55 kr.	24 kr.	39½ kr.	13 0	7 9	9 4½	9 3	7 4½	8 3¼
,, U.S.	—	—	—	—	—	—	—	16 0	7 6	11 9
,, Hamburg	—	—	—	—	9 1½	5 4½	7 0	6 6	5 2½	5 10¼
,, Stettin	—	—	—	—	10 0	8 3	9 1½	9 6	5 3	7 4½

* Neutral steamers.

TABLE II. (*Continued.*)—HIGHEST, LOWEST AND MEAN FREIGHT RATES, 1920, 1921 AND 1922.

Ports.	Highest war period freight.	1920. Highest rate.	1920. Lowest rate.	1920. Mean.	1921. Highest rate.	1921. Lowest rate.	1921. Mean.	1922 (to September). Highest rate.	1922 (to September). Lowest rate.	1922 (to September). Mean.
ORE FREIGHTS—										
Bilbao to Middlesbrough .	40 0*	39 6	15 0	27 6	16 0	6 0	11 0	8 3	7 0	7 7½
,, Tyne	40 0*	38 0	17 0	27 6	13 0	7 9	10 4½	7 0	6 9	6 10½
Bordeaux to Bristol Channel.	25 0	35 0	18 0	26 6	12 6	8 0	10 3	11 6	8 6	10 0
HOMEWARD FREIGHTS—										
Calcutta to U.K./Cont. . .	800 0	180 0	97 6	138 9	55 0	50 0	52 6	26 3	26 3	26 3
Rice Ports do. . .	600 0	180 0	75 0	127 6	65 0	32 6	48 9	35 0	23 9	29 4½
Bombay, d.w., do. . .	410 0	155 0	45 0	100 0	50 0	20 0	35 0	27 6	17 0	22 3
Java (sugar) do. . .	300 0	200 0	70 0	135 0	72 6	30 0	51 6	35 0	30 0	32 6
Australia to U.K. basis . .	105 0†	150 0	75 0	112 6	82 6	50 0	66 3	52 6	35 0	43 9
Alexandria to London or Hull (per 60 c.f.)	140 0	55 6	20 0	37 9	22 6	10 0	16 3	12 6	9 6	10 9
River Plate to U.K./Cont. .	280 0	215 0	35 0	125 0	60 0	16 6	38 3	37 6	16 0	26 9
Sundsvall to East Coast . .	250 0	250 0	100 0	175 0	105 0	70 0	87 6	67 6	42 6	55 0
N. Range to U.K. (grain, per qr.)	250 0	—	—	—	6 9	3 3	5 0	5 3	2 0	3 7½
Montreal to U.K./Cont. (grain, per qr.)	—	13 6	10 0	11 9	6 6	4 0	5 3	4 9	3 0	3 10½
Gulf Ports to U.K./Cont. (grain, per qr.)	230 0	18 0	7 9	12 10½	9 6	4 10½	7 2¼	5 9	3 3	4 6
TIME CHARTERS—										
General trade (12 months) .	47 6 to 49 0	27 6	10 0	18 9	8 6	5 0	6 9	5 0	4 0	4 6

* Neutral steamers. † "Direction" rate.

Table III.—Chamber of Shipping Geometrical Freight Averages.

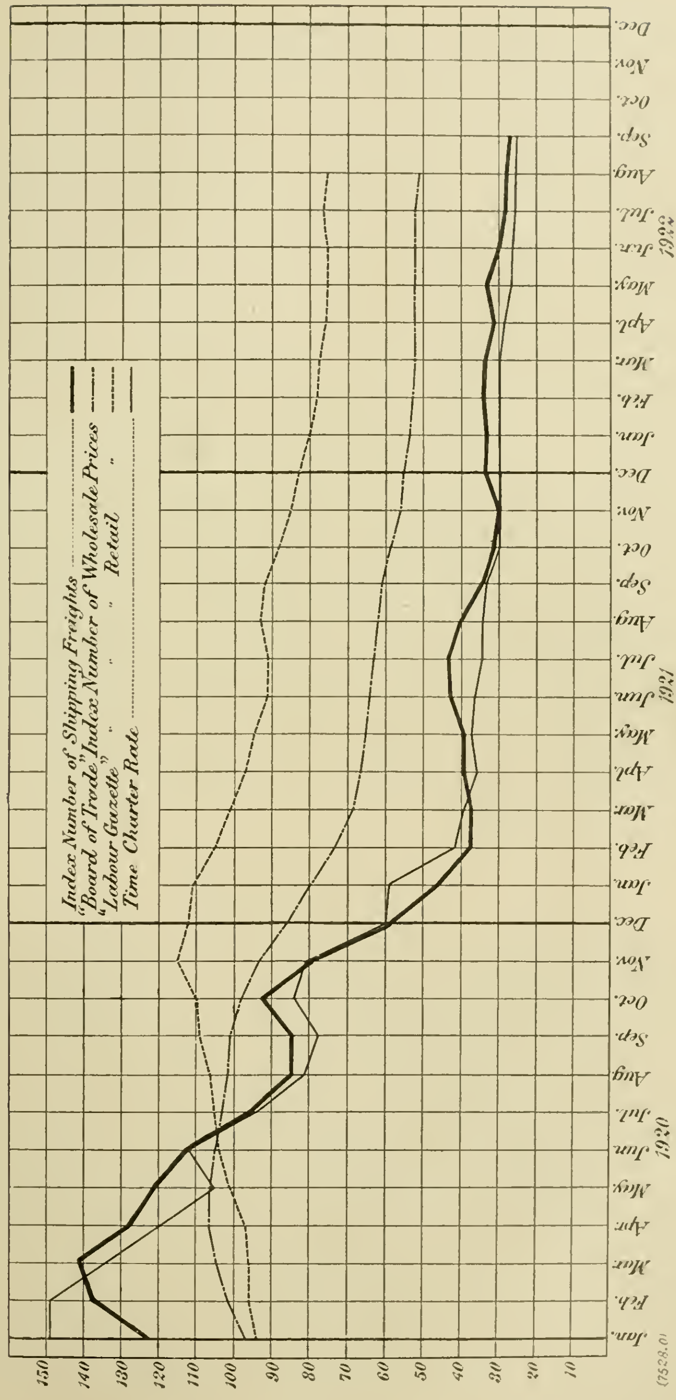
Route.	Freight per Ton, Geometrical Average in Shillings.*										
	1920.	1921.	1922. Jan.	1922. Feb.	1922. March.	1922. April.	1922. May.	1922. June.	1922. July.	1922. Aug.	1922. Sept.
1. Alexandria to U.K.	35·89	37·74	24·85	30·66	33·44	33·44	—	—	27·40	—	25·08
2. Bilbao to Cardiff	16·0	50·72	42·18	43·36	44·06	41·40	45·70	40·83	42·57	45·31	45·31
3. Cardiff to St. Vincent	31·03	39·56	33·85	34·38	38·68	37·06	34·64	33·03	33·85	37·66	36·06
4. Cardiff to Port Said	43·59	35·59	34·03	35·43	35·44	32·69	31·26	29·39	27·53	30·54	31·59
5. Pit Props, Baltic to U.K.	140·25†	39·69	—	—	—	—	—	33·51	33·92	—	—
6. Bilbao to Middlesbrough	24·74	34·83	30·32	30·32	32·34	32·34	—	3·53	31·33	31·33	31·33
7. Bilbao to Bristol Channel	19·76	42·62	35·42	36·69	36·05	39·85	36·05	32·89	35·42	46·81	37·95
8. Hornillo Bay to U.K.	24·59	36·68	28·47	30·50	32·53	32·53	32·53	30·50	40·67	26·94	28·98
European Waters	—	38·59	32·33	34·22	35·88	35·45	35·71	32·90	33·70	35·67	33·35
9. Karachi to U.K./Cont.	87·55	28·84	—	—	23·99	—	—	—	20·56	—	—
10. Rice Ports to U.K./Cont.	119·47	37·58	25·11	23·02	25·42	28·04	—	—	22·50	26·16	25·53
11. Bombay to U.K.	89·43	30·22	26·56	25·44	27·95	22·92	21·38	19·29	20·0	21·24	22·08
Red Sea, Arabia and India	—	31·48	25·82	24·20	25·74	25·35	21·38	19·29	20·99	23·57	23·74
12. Java to U.K./Cont.	124·08	37·04	—	—	—	28·21	24·18	24·18	24·68	25·52	24·98
13. Australia to U.K.	140·19	43·30	35·23	36·47	36·56	33·88	32·77	28·83	24·97	24·97	26·75
14. River Plate (Lower Ports) to U.K./Cont.	99·94	31·56	36·27	31·64	27·52	25·64	28·27	26·64	19·26	22·01	17·26
15. San Lorenzo to U.K./Cont.	92·32	41·14	35·74	35·17	31·82	29·38	33·58	28·70	25·18	24·51	22·75
Argentina, Uruguay, etc.	—	36·85	36·00	33·36	29·59	27·45	30·81	27·65	22·02	23·23	19·82
16. Brazil, Bahia Blanca to U.K.	88·27	35·96	36·82	36·79	34·70	—	31·30	27·76	25·49	23·80	21·24
17. Northern Range to French Atlantic	14·16§	34·10	—	—	—	23·73	—	22·18	20·17	17·40	17·40
18. Northern Range to West Italy	16·72§	30·17	31·78	—	28·14	21·44	26·80	26·80	25·13	11·47	21·49
19. Gulf Ports (grain) to U.K./Cont.	12·53‡	57·10	39·90	37·91	37·91	—	33·96	33·96	32·18	31·28	26·81
20. Gulf Ports (timber) to U.K./Cont.	403·2	40·35	37·20	38·44	40·30	34·72	47·12	33·85	33·48	31·00	26·04
United States	—	37·30	36·13	38·17	35·03	26·04	35·00	28·75	27·18	23·27	22·60
21. Canada to U.K. (grain)	11·08‡	50·94	—	37·23	39·49	38·36	38·36	40·62	33·13	30·46	33·85
Geometrical Average of all Routes	—	**37·59**	**32·97**	**33·57**	**32·25**	**30·96**	**32·52**	**29·88**	**27·80**	**27·55**	**26·70**
Time-Charter Rate	16·73	36·34	29·88	29·88	29·88	28·39	26·89	26·14	25·40	25·40	25·40§
Board of Trade Wholesale Prices	—	64·1	53·3	52·6	52·0	52·3	52·3	52·0	52·0	51·0	—
Labour Gazette Retail Prices	—	94·02	80·17	78·50	77·67	76·00	75·58	75·2	76·83	75·58	—

* The geometrical average for 1920 for the corresponding route or routes is taken as 100. † Per standard. ‡ Per quarter.

§ This index number corresponds to a time charter rate of 4*s*. 3*d*. per d/w ton per month as compared with an average of 5*s*. 7½*d*. for 1913 and 4*s*. 4½*d*. for 1914.

INDEX NUMBER OF SHIPPING FREIGHTS.

COMPILED BY THE STATISTICAL DEPARTMENT OF THE CHAMBER OF SHIPPING OF THE UNITED KINGDOM.



reduced to a geometrical average over all trade routes. Thus Table III. on page 216 and the diagram on page 217 show the index numbers for the usual classified trade routes since 1920, and the descent of the markets can be traced from year to year and from month to month. The lowest geometrical average of last year was reached in November, when 29·78 per cent. was returned. In the months succeeding, and right up to May, the average ruled well above this low figure, being up to 33·57 per cent. in February, and down to 30·96 per cent. in April, but after a recovery to 32·52 per cent. in May, there was a fall to 29·83 per cent. in June, since when the average has been consistently below the lowest of 1921, declining to 27·80 per cent. in July and to 27·55 per cent. in August. Roughly, therefore, freights have tended to decline steadily since the early months of the year, while since June, the decline has been pronounced and the second half of the year has been decidedly worse than the first half. Taking the geometrical average for the month of August (27·55) as the lowest of the year at the time of writing, the figure for the corresponding month of 1921 was 40·21, and for the same month of 1920, 84. The geometrical average over all for 1920 was 100, and for 1922, 37·59. It is clear that the average for 1922 must fall much below that returned for last year, and cannot in the nature of things greatly exceed 30. The time charter averages, it will be seen, have ruled consistently below the general geometrical averages, while, as was found to be the case last year, wholesale prices have followed the downward trend of freights fairly enough, but in the case of retail prices the fall has not been so marked, these in August ruling at 75·58 per cent., though wholesale prices were down to 51·0 per cent. Evidently there is something in these retail prices which is subject for legitimate inquiry, and the popular outcry against them is not without some cause.

The Outlook.

Of the outlook, it is to be said that, in the immediate view, the probability is that the worst is past. The suspension of coal shipments to America has not been followed by a slump in coal freights; there is a fairly sustained world demand for coal which promises at least moderately good employment for shipping over the winter. Also there is much grain to come forward during the winter months, and in September there was a better tone in grain freights from America and Argentina. Nitrate freights, too, are steadily on the up grade in view of the large shipments which must be made to Europe. Rice shipments from the East are assuming something like normal proportions. Iron ore is wanted in increasing quantities as additional iron furnaces are being lighted in Great Britain. Oil imports into this country are reaching still larger figures now that the huge refinery of the Anglo-Persian Oil Company, at Llandarcy, is in full operation. The Baltic States are sending more wood to this country and to Western Europe and the activity of the building trades promises a better demand for it. The textile industry in

England is developing activity and that means larger imports of raw cotton and fuller exports of piece goods. The engineering trade, also, is brightening and exports of machinery should soon begin to expand, while it is not too sanguine to hold out the same hope for the iron and steel trade.

Opinion is growing that some measure of trade revival cannot be long delayed. There are marked signs of its coming in the United States which, nowadays, usually leads the way in such movements. If world reconstruction after the war can be once fairly started, there will be employment enough for shipping. On the other hand, there can be no real improvement until the vexed questions of German reparations and Allied war debts have been definitely settled and the exchanges stabilised. In the new American tariff there lies danger of restricted exports across the Atlantic and inevitably, as a consequence, though the Americans do not see it, reduced exports of foodstuffs and raw materials from their country. Still more danger lies in the new American ship subsidy bill, with its policy of exclusion, and in a far too general tendency abroad to "protect" national shipping and develop State-aided schemes. Great Britain has many rivals on the high seas and competition in the carrying trade is bound to increase, with a resultant general cheapening of ocean transport. Success will be to that country which possesses the most efficient and economical ships and the near future promises to see changes in types and methods of propulsion which will represent a revolution comparable with that which, in the second half of the nineteenth century, replaced the sailing ship by the steamship.

R. W. JOHNSON.

CHAPTER III.

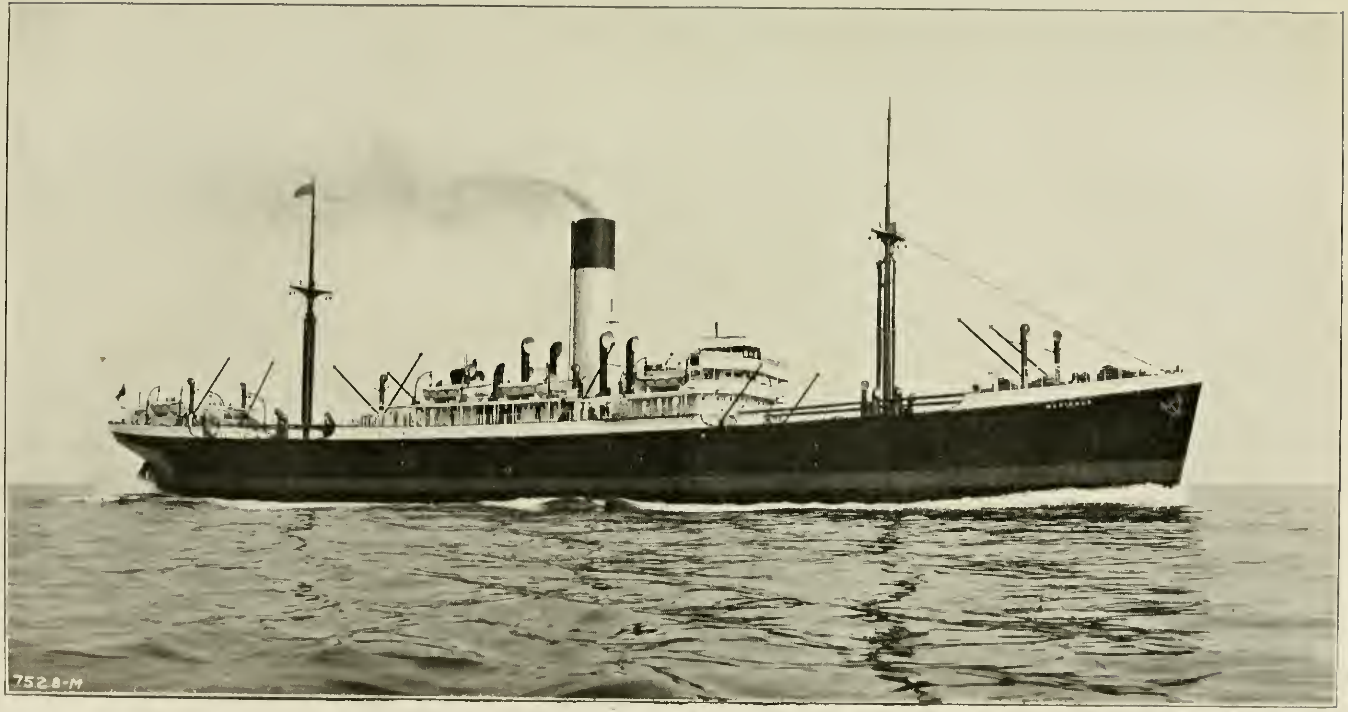
STANDING OF THE WORLD'S MERCHANT FLEETS.

THERE is more mercantile tonnage afloat to-day than ever before in the history of the world. Whereas in 1913 the gross tonnage amounted to just under 46,000,000, it now approaches 64,500,000, and in the meantime there has been a great contraction of the trading activities of the maritime and other nations, which has produced a state of depression in the shipping industry to which there is no parallel. Many million tons of cargo-carrying vessels are lying idle for want of employment, and thousands of merchant seamen are consequently without work. Though the depression is severe, there are already indications that it is only a passing phase due to the widespread economic disturbance produced by the Great War.

Crude statistics as to shipping are usually deceptive and that statement is peculiarly applicable to the existing conditions. While it is true that, excluding vessels of 100 tons and under, there are afloat 33,935 ships of 64,370,786 tons, this total must be subjected to a considerable reduction before we can reach an approximate estimate of the strength of the merchant fleets of the world which are available for the transport of passengers and goods. The sailing ship is of decreasing importance; wooden and composite steamers are of little account; oil tankers represent a new and growing trade of a special character; and drifters and other fishing vessels of 100 tons and upwards must be excluded, as well as the lake steam tonnage of the United States and Canada. If allowance be made for these ships, which have little or no relation to the transport problem, we obtain the statement given in Table I:—

TABLE I.—TONNAGE AVAILABLE FOR PASSENGER AND GOODS TRANSPORT.

	No.	Gross tons.	No.	Gross tons.
Total tonnage of the world . .			33,935	64,370,786
Sailing ships	4,680	3,027,834		
Wooden or composite ships . .	3,380	2,214,985		
Oil tankers	977	5,057,000		
Drifters and other fishing vessels	3,625	2,214,985		
Lake steamers, U.S.A. . . .	469	2,155,904		
,, ,, Canada . . .	72	170,070		
			13,203	14,840,778
Shipping available for passenger and goods transport			20,732	49,530,008



HOLT LINER MERIONES.

Built and engined by Palmers Shipbuilding & Iron Co., Ltd., Hebburn-on-Tyne.

By this process we reach a fairly accurate estimate of the tonnage which is available for the world's sea carriage in which is included ocean trading as well as coastal trading, the latter being reserved by the United States, France, and some other countries, including the Commonwealth of Australia, to vessels under the national flag.

The aggregate tonnage of steam and motor vessels is not all of equal efficiency. Age is generally accepted as a fair criterion of efficiency, and investigation shows that a considerable proportion of these ships are twenty years old or more. This is clearly indicated in Table II.

Table II.—Numbers of Vessels of Various Ages and Tonnages.

Division of Tonnage.	Division of Age.						Total.
	Under 5 years.	5 and under 10 years.	10 and under 15 years.	15 and under 20 years.	20 and under 25 years.	25 years and over.	
100 and under 500	2,264	1,918	1,594	1,581	1,175	3,093	11,625
500 ,, 1,000	776	380	385	354	277	990	3,162
1,000 ,, 2,000	899	510	418	526	357	1,065	3,775
2,000 ,, 4,000	1,895	437	422	593	560	964	4,871
4,000 ,, 6,000	1,505	459	435	452	354	211	3,416
6,000 ,, 8,000	855	301	194	169	103	41	1,663
8,000 ,, 10,000	196	88	42	49	31	6	412
10,000 ,, 15,000	99	54	41	13	39	9	255
15,000 ,, 20,000	27	11	4	6	2	—	50
20,000 and above	6	7	5	7	1	—	26
Total . .	8,522	4,165	3,540	3,750	2,899	6,379	29,255

These statistics suggest that as soon as shipbuilding has reached an economic basis, orders for new ships will be forthcoming in considerable volume, giving an impetus not only to activity in the shipyards, but to activity also in the marine engineering and other establishments, which are concerned with the equipment and fitting out of mercantile vessels, besides reacting favourably on the steel, iron, and other trades. The influence which the shipping industry has upon unemployment is frequently under-estimated. It is widespread in its character, and there are few bodies of wage earners who do not directly or indirectly benefit from the prosperous state of the mercantile marine. The movement back to an economic wage level in the shipyards, engineering, and other establishments is being checked in great measure by the rivalry of trade unionists and the failure of their leaders to realise the interdependence of one trade on another.

When every allowance has been made for ships unsuited for one reason or another for general trading purposes, it is apparent that there still remains afloat a far greater volume of tonnage than existed before the war, and in this connection Lloyd's Register has prepared an interesting table showing the shipping—steam, motor, and sailing—of 100 tons and upwards owned by the maritime countries of

the world, in order of importance, the figures, of course, including oil tankers. We give this in Table III. below :—

Table III.—Number and Tonnage of Vessels owned by Various Countries.

Order of strength.	Country.	Steam or Motor.		Sailing vessels.		Total.	
		No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
1.	United Kingdom	8,430	19,088,638	419	206,999	8,849	19,295,637
	Australia and New Zealand	595	747,214	41	18,824	636	760,038
	Canada Coast	557	894,318	320	126,666	877	1,020,984
	Canada Lakes	72	170,070	—	—	72	170,070
	Hong Kong	93	228,113	1	3,756	94	231,869
	India and Ceylon	166	223,510	48	11,590	214	235,100
	Other Dominions	350	263,145	229	59,676	579	322,822
	British Empire	10,263	21,615,009	1,058	427,511	11,321	22,042,520
2.	United States— Sea	3,765	13,576,640	1,121	1,161,866	4,886	14,738,506
	Northern Lakes	469	2,155,905	23	91,786	495	2,247,690
	Philippine Islands	97	75,918	2	346	99	76,264
	Total	4,331	15,808,462	1,149	1,253,998	5,480	17,062,460
3.	France	1,723	3,537,382	371	308,410	2,094	3,845,792
4.	Japan	2,026	3,586,918	—	—	2,026	3,586,918
5.	Italy	1,016	2,698,722	397	167,613	1,413	2,866,335
6.	Holland	1,100	2,617,485	64	15,228	1,164	2,632,713
7.	Norway	1,716	2,417,680	136	183,181	1,852	2,600,861
8.	Germany	1,533	1,785,767	190	101,64	1,723	1,887,408
9.	Spain	780	1,215,276	193	10,523	973	1,282,757
10.	Sweden	1,122	1,040,032	223	74,996	1,345	1,115,375
11.	Denmark	622	963,142	200	75,343	822	1,038,138
12.	Greece	361	657,604	18	67,481	379	668,127
13.	Belgium	270	571,074	5	8,403	275	579,477
14.	Brazil	349	469,444	50	23,127	399	492,571
15.	Portugal	155	237,339	131	48,539	286	285,878
16.	Finland	190	122,954	162	90,717	352	213,671
17.	China	134	188,388	—	—	134	188,388
18.	Argentine	173	161,588	43	19,967	216	181,555
19.	Chile	107	121,122	19	10,279	126	131,401
20.	Danzig	38	97,502	4	9,729	42	107,231
21.	Peru	30	68,363	44	32,846	74	101,209
22.	Fiume	63	81,210	1	152	64	81,362
23.	Jugo-Slavia	65	81,204	—	—	65	81,204
24.	Uruguay	41	65,265	12	11,406	53	76,311
25.	Roumania	31	72,297	—	—	31	72,297
26.	Cuba	49	55,179	16	7,498	65	62,677
27.	Esthonia	38	32,149	60	13,110	98	45,259
28.	Latvia	37	32,298	30	7,826	67	40,124
	Other countries	744	663,309	55	28,326	799	691,635
	Country not stated	148	278,788	49	30,344	197	309,132
	Total	29,255	61,342,952	4,680	3,027,834	33,935	64,370,786

The outlook for British shipping is not cheerful. As Sir Frederick Lewis, President of the Chamber of Shipping in the United Kingdom, has pointed out, freights usually are on an average only about one-fifth of what they were during 1920, which, of course, is simply the

reflection of falling trade, and the result is that there were on July 1 laid up in our home ports alone, no less than about 532 vessels of just over 1,000,000 tons nett register, or, say, 2,500,000 tons d.w. That is to say, 10 per cent. of the British Marine Fleet is lying idle for lack of profitable employment.

Other countries, with lower wage costs ashore and afloat, are adding to their fleets; while the volume of British tonnage during the twelve months ended June 30, 1922, decreased by 23,400 tons, and that of the United States showed little advance. A comparison between the figures in the 1922–23 and the 1921–22 editions of Lloyd's Register Book reveals that the world's *total* steam and motor tonnage now exceeds by $2\frac{1}{2}$ million tons the figures for the previous year. The countries where the largest increases took place during the twelve months are as follows :—

Germany . . .	1,131,000 tons	France	239,000 tons
Holland	409,000 ,,	Japan	232,000 ,,
British Dominions .	258,000 ,,	Italy	231,000 ,,

The increase in the German tonnage is due partly to new vessels built in the years 1920–1922 and now registered as German, and partly to the transfer to the German flag of ex-German vessels which had been allocated or sold to other countries.

The tonnage of Germany has been more than doubled during the past twelve months under the influence of the German Government's scheme for subsidising the construction of vessels to replace those lost under the reparation clauses of the Treaty of Versailles. If age be a test of efficiency, the new German mercantile marine, constructed under all the advantages arising from the low rate of exchange and the low rate of wages, promises to be highly efficient. In this respect the British fleet compares unfavourably with the fleets of some other countries. Of the seagoing vessels of the United States nearly 63 per cent. have been built in the last five years. The percentages for other countries are: Japan 40 per cent., France and Holland $33\frac{1}{3}$ per cent., Germany $31\frac{1}{2}$ per cent., Belgium 31 per cent., and Denmark 30 per cent., whereas the percentage in the United Kingdom is less than 23. When costs of building in this country are such as to tempt shipowners, there will evidently be no lack of work in the British shipyards and marine engineering establishments, and that activity will exercise a healthy influence over many other industries.

THE EDITORS.

CHAPTER IV.

Shipowners and Shipbuilders.

That the shipbuilder is commercially dependent upon the shipowner is true in the limited sense that if there were fewer orders for ships there would be less shipbuilding and much less of shipbuilding to owners' specifications. But it is the essence of efficient shipowning that orders for ships should be forthcoming with more or less regularity. Especially is this the case in the passenger trades of the great lines. If a line is to retain its accustomed clientèle against encroachment by rival concerns, whether of its own or foreign flags, its fleet must entrain a ceaseless process of renewal and improvement. In a lesser, but still vital, degree this is true of the cargo steamer, and it is true down to the smallest detail of up-to-date efficiency. Given two lines in any trade, and other things being equal, that line which, for example, by its superiority of holds, hatchways and lifting gear can give the cleaner and quicker delivery at the quayside will enjoy some preference amongst the constituents of the port. This is, perhaps, bringing the principle of competition down to a fine point, but no shipowner can continue to exclude an accepted public facility from his ships without prejudice to his business.

The great shipping corporations are, perhaps, less dependent on the shipbuilder than is the owner of smaller tonnage and fewer ships, who must more completely rely upon outside professional advice; but each, in a varying degree, must look to the shipbuilder for guidance in the adoption of advanced principles of design, construction, power or equipment. Efficient shipowning makes for efficient shipbuilding, and efficient shipbuilding makes for commercially successful shipowning. The two things must continually act and re-act. It is easier to run profitably a well-planned, well-constructed and well-engined ship than one which is not so well provided, and, viewed from this angle, it is plain that British owners and British builders best work for their own profit and for the well-being of the shipping industry when there is close and cordial co-operation between them.

Influence of Trade on Ship Types.

In considering the relation of shipbuilder and shipowner, one reflects that a regular trade must, in the nature of things, evolve its own type of ship. An example of this is afforded by the present-day ships of the British India Company's "Aronda" class, by which the fast bi-weekly service for the conveyance of mails, passengers

PENINSULAR AND ORIENTAL LINER MOLDAVIA.
Built and engined by Messrs. Cammell Laird & Co., Ltd., Birkenhead.

and cargo between Calcutta and Rangoon is maintained. The British India Company commenced operations in 1856 as the Calcutta and Burmah Steam Navigation Company. It was established at the instance of the Honourable East India Company for the especial purpose of carrying on a regular mail service between, as its name indicated, Calcutta and Burmese ports. That mail service has been continued practically without a break to the present day. At the time of its inception there were upon the eastern side of India no steamers but those of the Peninsular and Oriental Company, a few Government transports and one or two ships engaged in the China opium trade. The home trade of India was divided between the native vessels and square-rigged ships owned by European merchants and manned by European officers and native crews. These latter vessels vied with those of the Government in smartness and dexterity of handling; they were armed, and often in the course of voyages had to make ready for a skirmish with Arab pirates or Malay robbers. They carried little besides their owners' cargoes, but they were of a type evolved by the conditions of their employment. There was, at the outset, no time to build steamships for the Calcutta-Burmah service, and two vessels, the "Cape of Good Hope" and the "Baltic," were purchased and sent out to India round the Cape—at that time a tedious and expensive voyage. In the early days the conditions indicated no very special demands as to the type of ship to be constructed; but with the development of trade and the resulting increase in the number of Europeans in Rangoon and the minor Burmese ports, the essentials of this local service began to be perceived. Greater trade activity was followed by more intimate business relations between the two neighbouring communities and this condition of things was inevitably succeeded by closer attention to the comfort of passengers. It was early apparent that, in steamers which plied constantly in tropical waters, passenger accommodation must be especially designed to meet that condition, and as much was done in this direction as the imperfect resources of the period permitted. Among the travellers on these vessels were to be found occasionally the responsible heads of the company and members of their supervising staff: it is a safe assumption that these people travelled with the lamp of their intelligence constantly burning and with a keen eye to derive practical values from the suggestions of a more or less practical nature which passengers, amongst others, laid before them. Throughout the sixty-six years which have intervened, the evolution of type in the steamers of this route has proceeded, and a detailed examination of the first vessels to be built for the line and those of the present day would discover no great similarity between the two. The small fast tropical mail steamers of to-day are the especial product of the trade in which they are employed and possess local characteristics which distinguish them from those of any other trade in the world. Of high speed, and especially fitted for the quick handling of mails and a limited cargo, these ships provide every week two express services in each direction, and in them passengers find cool comfort and uncrowded space on a journey which occupies only 48 hours.

At the time of writing, the P. & O. Company has, in various stages of construction, four mail steamers totalling some 75,000 gross register tons. The British India Company is anticipating the delivery of the latest of 20 steamers of the "Malda" type. In these vessels it has been possible to unite the best practice and experience of each owner and builder during the past twenty-five years. They will, it is expected, be good owners' ships, and from the passengers' point of view they will certainly not be behind their forerunners in the trades of the eastern hemisphere. They should exemplify the balanced compromise between technical efficiency and commercial requirements which it must ever be the aim of the shipbuilder and shipowner, in combination, to effect.

The Processes of Evolution.

In the process of ship-evolution two factors have constantly worked side by side, which may illustrate the theme of this chapter. On the one hand there has been incorporation of the general science or art of ship and engine construction, with all the successive improvements in main and auxiliary machinery, including machinery on deck, expressing the patient research and achievement of the shipyards; on the other, the selective process by which, from a multitude of ideas, the steamers have, through the medium of their responsible administrators, gathered to themselves, and sometimes created, the especial features and improvements of detail necessary for the successful oncarrying of their individual trade.

Owners of large fleets of costly tonnage possess in their superintendents and technical staff an aid to policy which, to owners and builders alike, is of great value. The business of the technical officials is, among other things, to collate the observations and reports of the executive afloat or at the quayside, and to reduce this experience to exact terms. But, with an occasional exception, a company's superintendents usually turn their attention to these matters as part of a wider range of duties which preclude them from concentrated and continued regard of the finer problems of form and power. They are more intimately concerned in keeping themselves informed of each development in the multifarious equipment, furniture and apparel of ships, with especial reference to the trades in which their owner's fleet may be engaged.

Generally it may be said that the dimensions of a steamer, the details of her passenger accommodation, the disposal of her carrying spaces, the choice and arrangement of her cargo gear, and, above all, the determination of her economical speed and bunker capacity (speed also involving some consideration of the fineness or otherwise of her lines and hull contours), are matters which naturally grow from the external conditions of the trade in which she is engaged, and that one chief business of the shipowner is to maintain an alert and critical mind so that, in the projection of new ships, the accumulation of experience and suggestion may enable him to mark, in his later steamers of any given type, some advance upon their predecessors. The chief function of the shipowner, if he is to get the

best values out of his relations with the shipbuilder, is a digestive one. In other words, it is up to the shipowner to accumulate data from voyage to voyage; to determine how much of that which is new in the way of ideas can be usefully applied; to reject that which is not germane to profitable and efficient running, and to pass on the selected data to his ship-designer and shipbuilder. In the early marshalling of these matters the shipowner must rely upon his expert staff, but the final responsibility of decision must, for good or ill, rest with himself.

In considering the design and equipment of a ship, inside, outside and in the engine-room, the paramount consideration of the shipowner must always be that she shall be capable of earning her living. To do this she has to pay and feed her crew; to pay all her running and port expenses and the cost of her upkeep; to provide a return for those who are immediately responsible for her management and their staffs; to pay interest on the capital invested in her; and to put by year by year money in sufficiency for her own replacement whenever, by casualty or the lapse of time, that may become necessary. Moreover, as there is no standing still in shipbuilding policy, she must, in the course of her life, provide not only an amount equal to her own original cost, but the larger amount necessary to produce a successor, of larger tonnage, more elaborate fittings and improved type, whereby that successor may exhibit the experience of the intervening years to all concerned, not least of whom is the travelling public. And here a word may be said on the subject of the responsibilities which the shipowner and the shipbuilder must, for better or worse, shoulder together. The shipbuilder is legally quit of his liability when he has fulfilled his contract, but it is pretty safe to say that his sense of responsibility does not end there; the long test is, however, with the shipowner. But the projection of a group of expensive passenger steamers of uniform type, which may involve a capital expenditure running into millions of pounds sterling, demands, in the most fortunate circumstances, from shipowner and shipbuilder alike, a certain quality of courageous judgment, and not a little imagination, besides the basic attributes of knowledge and experience.

Experts in Design and Construction.

In the best practice of later years it has been the custom of our great shipbuilding firms to recruit promising material from our universities and technical colleges and to train the young man so selected for the work of design and construction. From the ranks of these cadets there have inevitably emerged men whose attainments have marked them for the highest responsibilities; and it is to be recognised that, in the past, appreciation of the value of early technical training by the heads of the shipbuilding and engineering trades was not lessened by the fact that they themselves had, in many cases, passed through the workshops as young men and had had, in their early middle years, to gather by laborious effort that equipment of technical and scientific knowledge which the lack of specialised educational facilities had, at the outset,

denied to them. To the joy of personal achievement and fulfilled ambition, these pioneers must have added the happy reflection that their travail had not been in vain and that their own laborious experience had widened and smoothed the road for the younger generation. That the younger men were eager and able to grasp the opportunity, there are to-day a number of sufficiently striking examples. It is upon these trained scientific minds that the shipbuilder and shipowner are able to rely for secondary aid, for by the light of their intellects is the path kept, through a maze of conflicting theories and ideas, which leads to the well of constructive truth.

If, therefore, it be true that, as regards detail, the shipowner must look to his own knowledge and experience, it is equally true that he must, as regards the forces of propulsion and resistance, primarily rely upon the untiring research of the shipbuilder and his expert staff and upon their familiarity with the two interdependent factors of power and modelling and the multitude of considerations and detail which on those factors depend.

The institution of the modern testing tank, with its almost daily development of efficiency, has given shipowners a sense of security in accepting shipbuilders' hull designs which formerly was denied to them, and it is possible to-day to forecast the performances of a commercial ship, in all varieties of trim, with a degree of accuracy which is valued alike by owners, loading brokers, superintendents and, finally, by those responsible for the safe navigation of the ship from port to port.

The Factors of Speed and Size in Cargo Steamers.

In staple trades, regularity of service tends to minimise the necessity for very high speed, and it is this fact which enables a steamer of moderate power to operate to the satisfaction of shippers and consignees. Take, as an extreme instance, a series of shipments of grain in bulk. Once the initial consignment has been delivered, provided that succeeding consignments arrive at reasonably regular intervals, it is a matter of little moment whether they cross the seas at 8 knots, or 10 or 12. Allowing 14 days in port at each end, it will take, on a round voyage of 10,000 miles, 10 steamers each of 5,000 d.w. tons to maintain a weekly delivery of 5,000 tons at the outward and homeward terminals. These steamers will travel at an economical speed of, say, 10 knots; will therefore be moderately manned, moderately engined and of moderate coal consumption; and will earn the general market rate of freight. To convey the grain at 15 knots would necessitate the employment of only 8 steamers, but of higher value and power, and the running of them at the higher speed would be more costly than the operation of a larger number of slower ships.

Almost equally, overseas markets accustomed to receive consignments of general cargo can afford, except in special instances, to ignore high speed in transit provided they can rely on regular arrivals and quick discharge. Herein lies to the shipowner the

virtue of the cargo-liner of large hold capacity, medium speed and a limited allotment of comfortable passenger accommodation, for the ratio of earning power to capital and running costs should be higher in such a ship than in the faster and more costly mail steamer. So much for speed. As to tonnage, it is, other things being equal, less costly to carry 10,000 tons of cargo in one full ship than in two, but there is in any trade a point at which enlargement of the floating unit ceases to be advantageous. General cargo is, and probably will continue to be, carried, as to nine-tenths of it, by the cargo-liner; but this trade involves a considerable amount of human intercourse, and from it is born a large part of the faster passenger traffic: and while a minority of passengers are content, for reasons of economy, to travel in the slower ships, the busy man or woman to whom time is a consideration and the leisured people to whom the extra cost of passage in a mail steamer is of no moment, make up between them the majority of the travelling public. And if, from the business of the cargo-liner, arises much of the passenger traffic of the faster steamer, the latter, again, by her extra speed and other superiorities, attracts to herself the choicest cargo, at the highest rates of freight, with little or no damage to the business of her humbler sister. Plainly the fleet is well constituted which embraces both elements in due proportion, for each is complementary to the success of the other.

Should Types of Ships be Standardised?

Some of the above arguments may have seemed to hint at standardisation of ships. Owners, in ordering groups of identical vessels, certainly do practise standardisation to a limited extent, but under ordinary conditions there is nothing to recommend the mass production of standardised ships. That is a method which may be described as the socialism of ship construction; and socialism may be likened to a race in which, theoretically, all competitors come in first, with no prizes. A properly constituted mercantile marine or a properly constituted human society must be productive of types of individual excellence in their particular walk of life, whether they be ships or men; and, in laying down the plans of a ship, once the broad principles of her constitution—capacity, buoyancy, stability and mechanical propulsion—have been conceded, there the similarity of ship to ship, or at least of type to type, must terminate and the region be entered in which lies the widest imaginable diversity of detail and assembly, and from which have been produced the hundred and one excellences of the shipbuilders' art and craft which are afloat to-day. Britain was the birthplace of the mechanically propelled ship; here has been generated all the best practice of the engineer and the naval architect. But it must never be forgotten that neighbouring races have time and again shown their capacity to receive British ideas in shipbuilding and to improve upon them; and this they have done partly as the result of widespread technical education, so that one is met by the uneasy thought that the common level of technical intelligence, in pre-war days, had reached in some

countries a higher mark than with ourselves. But the British have shown themselves—there were notable instances during the late war—capable, too, of assimilating the creations of clever foreign brains and, in no long time, of going one better; and there is no reason why we should not do this in the matter of technical schooling. Elementary science in our primary schools, of whatever type, and technical study in our secondary and public schools—the latter are perhaps not yet abreast of the needs of the time—are to-day receiving a measure of attention greater than ever before and this process must continue and expand if we are to regain our old place in the world.

This raises one other point—it seems to be of the first importance that our great shipyards and steel works should continue to keep an eye upon what their neighbours abroad are doing in the way of discovery and invention. Great principles of constructive industry—for all that they may be, for some time, used exclusively at their source—become, like great music and great architecture, the common property of mankind. Knowledge—for the taking—is for all; its application is the test in which the best man, the best shipyard, the best industrial community or nation, must in the long run win.

INCHCAPE.

A BRITISH OIL TANKER CARRYING OIL FROM BRITISH OIL FIELDS TO A BRITISH REFINERY.

CHAPTER V.

Marine Machinery in 1922.

The current year marks one of the most interesting periods, in regard to the scientific development of marine machinery, in the history of the propulsion of ships. Gradually the point of view of engineers, designers, and constructors has veered round from the angle resulting from intensive concentration during the war on naval practice and requirements, to the very different position demanded by considerations of mercantile service. During the two and a half years following the Armistice, such was the rush for tonnage that the opportunity for gradual evolution was not present. It has long been matter for discussion as to wherein the difference lies and of what moment is the change from naval to mercantile duties. When dealing later with the subject of mechanical gearing, examples will be given which will help to elucidate this point. In the previous issue of the "Annual" (pp. 213 and 236) it was stated that during this year a great many of the points then calling urgently for a solution would be much further on the way towards becoming established practice, and whilst it is not possible to aver that this prediction is fulfilled, perhaps owing to the conflicting nature of the evidence available, yet in many directions the position is very much less obscure than formerly.

Double Reduction Gearing.

In this chapter some of the lessons of this year will be discussed, and the first calling for full treatment is undoubtedly reduction gearing, as applied to turbine-driven steamships. A number of vessels fitted with single and double reduction gears have performed, over a number of years, with every satisfaction, although the difficulties experienced with the remainder have recently been more frequent and the solution more elusive than was to be anticipated. Earlier difficulties with the wearing and pitting of teeth, dealt with last year, have given place to troubles of a much more serious nature —the breaking off of teeth. The consequences of teeth breaking may be very serious. If the teeth on breaking off fall clear of the gearing as a whole, as fortunately is generally the case, the damage is limited to the one pinion; generally only a fraction of the length of one tooth breaks off, so leaving the gearing in quite a satisfactory condition for carrying on, if not at full power, at least at quite a reasonable power and speed of ship.

There is no guarantee whatever that teeth on breaking off will

not foul the other gears and so cause, as has been the case in several instances, such damage to the gears as to call for immediate replacement of the greater portion of the gearing within the gear box. That this state of affairs is most serious is obvious, since accurate gear cutting machinery is not found in many ports, and the laying up of a vessel until new gear can be made, cut, despatched to the ship and fitted on board, involves considerable expense, loss of time and earnings. Moreover, the mass of the main gear wheel, should this also require to be renewed, is considerable and the shipping of it on board, unless in a well equipped port, may not be readily arranged for. The main gear wheel may weigh as much as 40 tons.

This liability is not confined to any one design of gear or gear box, nor to certain materials, nor even to double reduction gearing as opposed to the single reduction variety.

To attempt to analyse the causes contributing to these failures, the subject may well be divided under the three headings of design, construction, and materials. To equate the design to the forces in play is not a simple matter in marine work and the difficulties in this direction are not easily appreciated by those without experience in this field. The peculiar conditions arising only in a ship at sea are the primary cause of the features peculiar to marine practice in all its branches. The actual pressure between the teeth, with perfect teeth cutting, exact alignment of the gearing shafts, and no torsional vibrations, assuming constant propeller torque, is a definite figure and must be such that there is an ample factor of safety to cover for inaccuracies in teeth formation and angle of helices, slight lack of alignment, deflection of the gear case, "working" of the ship, as well as the variations in torque due to the propeller operating in a wake of varying intensity. It was early realised that all these factors played an important part, and recent practice has unquestionably advanced considerably on earlier constructions in these particulars, as well as being based on higher factors of safety, without securing any advantage in respect to reliability of operation or security from tooth fracture. In fact, the evidence available leads definitely to the contrary conclusion, since fractures have recently become more frequent.

Teeth cutting is now generally very much more accurately performed, and before fitting on board, gears are meshed, run and touched up by hand to get a bearing along almost the whole length of the tooth. In connection with the securing of contact along the whole length of the tooth face, the practice adopted by one American firm, whose gears have been successful, may be cited. The set of gears, before installation on board, is erected in the shop and run against sufficient load to ensure contact of the driven against the driving faces. The covers of the gear case, which are of light construction, such as double steel plates with a layer of felt inserted to deaden any sound, are removed. As it develops, the marking on the teeth is carefully watched and a grinding paste, such as a mixture of carborundum and glass, is applied with a brush, until after 24 hours' running perfect contact is achieved. This method, as

an alternative to filing, with carefully rounded files, or "honing," is worthy of careful consideration, as it is equally logical and certainly more expeditious.

The rigidity of the gear cases has, if anything, been overdone, and in fitting to place on board, every precaution is taken to ensure that no distortion is there caused. Tooth pressures have been reduced, so giving theoretically a larger margin of safety, and in some cases, at considerable expense, single reduction gearing has been substituted for double reduction gearing. The one change recently favoured is to adopt a larger pitch for the first reduction teeth so permitting of a more robust tooth. It is with the first reduction teeth that fractures mostly take place. This is all the more surprising when it is recalled that in the words of Admiral Sir Geo. Goodwin, late Engineer-in-Chief of the British Navy, of over 600 sets of gears of the single reduction variety, troubles of a minor nature were only experienced with six. The actual difference between the duties performed by single reduction naval gears and the first reduction of double reduction sets, if assumed to be a maximum, is not sufficient explanation of success in the case of the single reduction and failure of the double. The present position can perhaps be partially attributed to the entirely different conditions of service called for in the merchant service, where approximately full power is called for day in and day out and a ship is only laid up for repair and overhaul for a minimum time per annum.

By way of summarising the foregoing, it may be said that the solution does not lie in the direction of substituting single for double reduction gearing. Low tooth pressures give no guarantee against tooth fractures. Accuracy of teeth cutting, rigidity of gears, and exactness of alignment are not all that is required.

Material of Gears.

The only remaining factor of primary importance is the material of which the gears, especially the first reduction, are constructed. There is evidence that this side of the question has perhaps not received sufficient attention, as quite simple tests on cut pinions before use, but after cutting, have revealed the fact that there is no absolute guarantee that cracks were not present in the heat-treated steel, as delivered to the engine builders. Hitherto, mercantile marine engineering has not demanded of the steel maker any qualities of materials of other than quite ordinary and normal grades. It is probable that the stresses to which marine mechanical gearing is subjected at sea, definitely call for higher specific qualities. This fact in no way condemns gearing. The example of the motor car may be quoted. If the average modern automobile were made of ordinary grades of steel, it would be an impossible proposition because of unreliability or excessive weight. In the manufacture of the cheapest car in the world, the one that exceeds all others in numbers in actual use, only the highest grades of steel are employed. When ships were designed with double reduction machines instead of single, and when the change was made with double reduction gears from low to

high powered ships, the material of which the gearing was constructed remained substantially the same as had given reasonable satisfaction in the past.

Requirements of Suitable Steel.

Very careful consideration of the subject, since these failures have been investigated, has revealed the fact that the important properties necessary in steel for this work are: (*a*) Toughness. (*b*) High true elastic limit. The three common steels in use for engineering work are:—

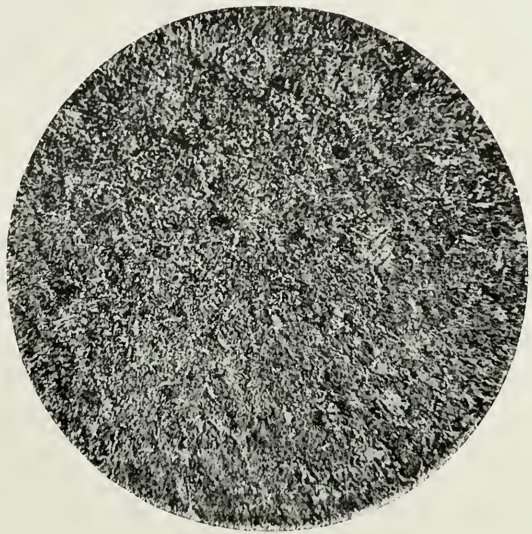
(1) Carbon steel.
(2) Nickel steel.
(3) Nickel chrome, or more complex steels with these two elements as a base.

An examination of these three steels in relation to the properties outlined in (*a*) and (*b*) leads to the following conclusions: Firstly, that carbon steel is unsuitable for pinions, either in the forged, forged and annealed, or forged and heat-treated condition, because it is impossible to obtain the two qualities simultaneously of toughness and a high true elastic limit. Carbon steel can be made soft in small masses, but although soft it is weak when subjected to shock; moreover since, in many cases, work can only be put on pinions in one direction, tests taken at right angles to this direction show considerable brittleness in the material. The weakness of heat-treated carbon steel is due to several factors, the principal being: (1) In masses it is impossible on cooling down steel to keep the carbon uniformly diffused through the masses. (2) On heating to remove the strains set up by hardening and to convert the carbon from the hardened condition to the troostite or pearlite condition, a further segregation takes place. Carbon steel, if made in its softest and toughest condition, has a very low elastic limit.

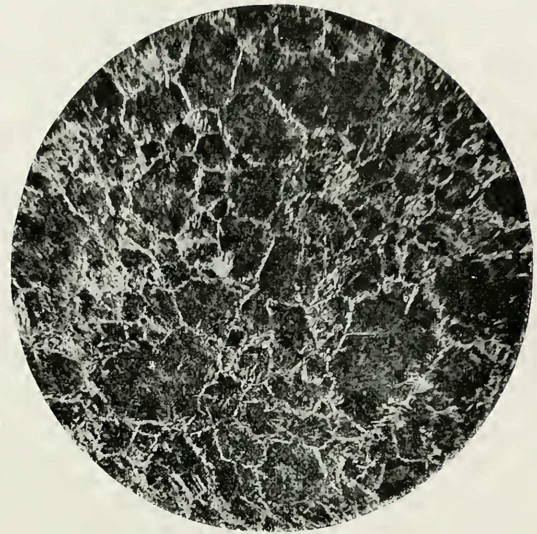
The second material to be considered is nickel steel. Nickel when added to steel is dissolved by the ferrite, thereby increasing its strength. Two steels of like carbon content, one containing carbon but no nickel, is weaker than a carbon steel containing nickel. Although nickel retards the changes which take place when steel is cooled from above the upper critical point, yet in the mass its influence only penetrates to a limited distance from the surface. The principal defect in nickel steel is that in masses the effect of cooling is superficial, *i.e.* the structural condition obtained by heating is only retained to a limited distance from the surface when cooled by the usual cooling methods, and microphotographs are given also on the following Plate illustrating this, showing the outside of the forging and the centre. The steels now more favoured for pinions, such as nickel-chrome steel or even more complex materials, have the following virtues: (*a*) On heating them to slightly above the upper critical point all the carbon goes into solution. The crystalline structure so obtained is therefore very fine, and further, on cooling by the usual methods, the lower critical point is depressed

MICROPHOTOGRAPHS OF HEAT-TREATED NICKEL STEEL FORGING.

Magnification 100 diameters.



Surface.

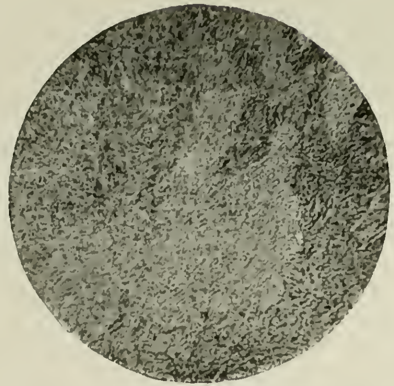


Centre.

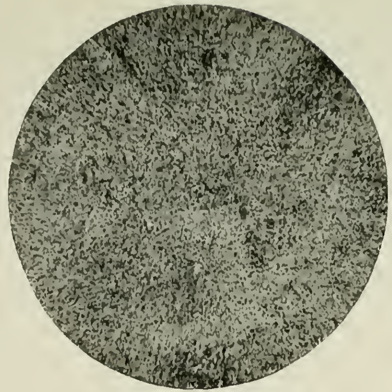
Note: On the surface, the carbon is well diffused and is principally in the troostite condition; the crystal boundaries are not well defined. In the centre, the cooling has not been sufficiently rapid, with the result that the crystals are large and the boundaries are well defined. The carbon is not so well diffused, and part of it is in the pearlite condition.

MICROPHOTOGRAPHS OF SPECIAL D.R. STEEL.

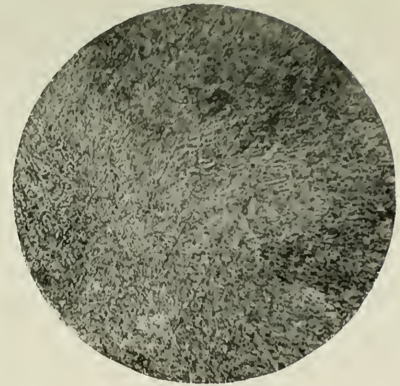
Magnification 100 diameters.



Surface.



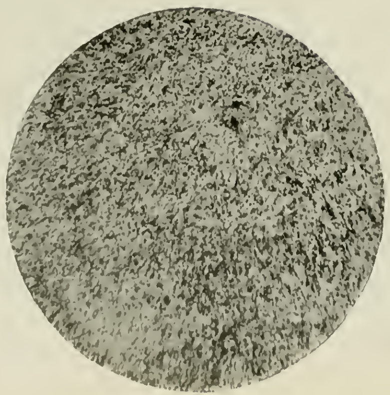
Midway between Surface and Centre.



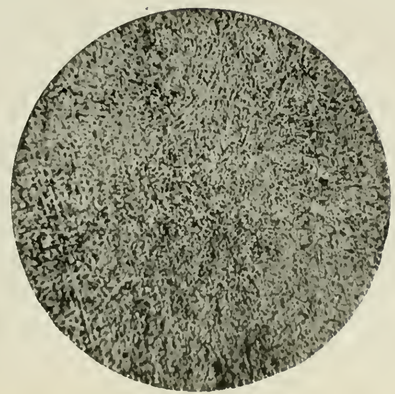
Centre.

The above represent the structure of the steel of a 20-in. diameter pinion.

Note : In all cases the grain is very fine, the carbon well diffused and in the troostite condition. These results show the desired uniformity.



Surface.



2 ins. from Surface.

Sleeves for Second-Reduction Pinions, showing the same result as with the Pinion.

The above should be compared with the Nickel-Steel Structures shown on the opposite Plate.

so that the carbon does not come out of solution on cooling down, and the condition obtained at high temperature of a fine structure is almost wholly retained when cold. (*b*) When finally heated to a suitable temperature, pre-determined properties, as regards toughness and true elastic limit, can be obtained.

The property of this steel of the greatest consequence in connection with the making of pinions is that in masses such as are used for double reduction pinions, uniformity of structure and physical properties can be produced throughout. The five microphotographs reproduced on the preceding Plate illustrate this point clearly. It is the general opinion that carbon and nickel steels are easier to manufacture than the more complex alloy steels, and that, further, the two first-mentioned types are more free from hair-line cracks, non-metallic or slag inclusions, and ghost lines, than the more complex ones, but it is not borne out by actual experience by those who machine all types of steel. Such defects of cracks are of course fatal to double reduction gearing. They might be caused as a result of: (*a*) Method of working the steel charge in the melting furnace. (*b*) The design of the mould. (*c*) The cooling of the metal from the molten condition to complete solidification.

The conditions, briefly stated, to obtain freedom from these defects may be summarised as follows: It is necessary to melt and work the charge at as high a temperature as possible. Further, the slag towards the end should contain a minimum ratio of ferrous oxide to silica. The moulds into which the metal is cast should have the wide end uppermost and the ratio of area of the top to the bottom should be considerable. The top of the mould should be lined with a refractory non-conducting material, so as to keep the top part fluid as long as possible. The arrangement for casting the metal into moulds should be such that the very hot metal is cooled and enters the moulds little above its solidification point.

The evidence obtained from failures of teeth in gearing reveals the fact that in almost all cases the types of fracture are similar. The following is a specification for material which has been very considerably worked to:—

	Length.	Transverse.
Elastic limit, per sq. in. .	28 tons per sq. in.	28 tons per sq. in.
Ultimate tensile strength .	40 to 45 tons per sq. in.	47 tons per sq. in.
Elongation on 2 in. . . .	17 per cent.	15 per cent.
Contraction of area . .	Not specified.	Not specified.
Bending	1 in. sq. 180°.	$\frac{3}{4}$ in. × $\frac{3}{8}$ in. 180°.
Izod	Not specified.	Not specified.

As in general works practice, the elastic limit is taken as synonymous with yield point.

The question of a true elastic limit has again been brought up by this investigation of gearing. It is known that nickel steel can be heat-treated, so that although a yield point of 28 tons is obtained the true elastic limit may be anything from 16 to 22 tons, which, however, must have been the case with many forgings for pinions for single, as well as double, reduction gearing.

In addition to true elastic limit, the other condition considered essential is toughness, and this property should not be sacrificed for elastic limit, the factor for toughness being first fixed, and then the true elastic limit decided therefrom. Such a specification would eliminate all steels except nickel-chrome and the more complex varieties, as it is the only type which, when heat-treated, can possess a high true elastic limit and a high degree of toughness. Toughness can be defined as that property which combines such a chemical and structural state in the best condition for resisting fracture when subjected to shock or alternating stresses. The Izod test is the one generally approved to-day, but it might be suggested that a more reliable result would be obtained if the following conditions were satisfied: (*a*) The falling weight should be considerably in excess of that necessary to break the toughest test bar. (*b*) The velocity at the point of impact should be high. The energy applied to break the test bar should be such that no appreciable deformation of the crystalline structure can possibly take place, because unless the test is actually broken the true result is not obtained.

In connection with the Izod test, the conditions under which it is applied should be standardised, and it might be suggested that the blow should always be struck in a direction parallel to the line of work.

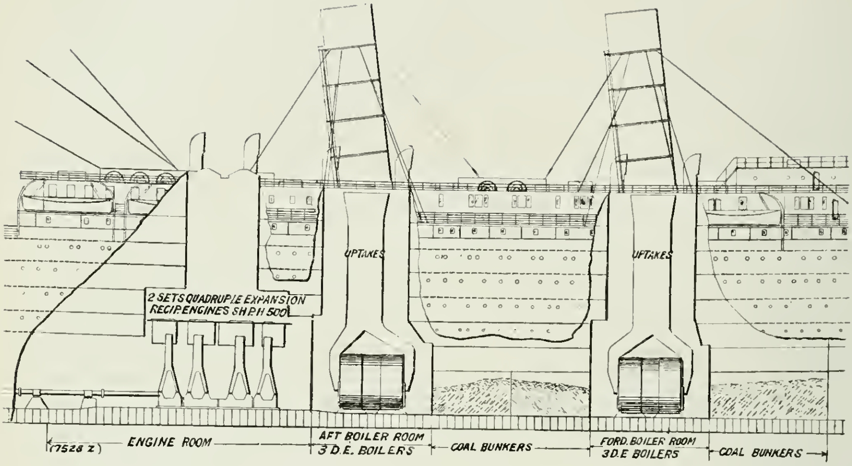
The following specification for gearing steel is one which promises to give the most satisfactory results in service, and the largest manufacturers of high-class steel in the West of Scotland have supplied steel to this specification, which is now being tried out, so far with complete success.

	Length.	Transverse.
True elastic limit, min.	30 tons per sq. in.	30 tons per sq. in.
Ultimate tensile strength, min	50 tons per sq. in.	50 tons per sq. in.
Elongation on 2 in.	18 per cent.	15 per cent.
Contraction of area	50 per cent.	35 per cent.
Izod	45 ft.-lbs.	30 ft.-lbs.

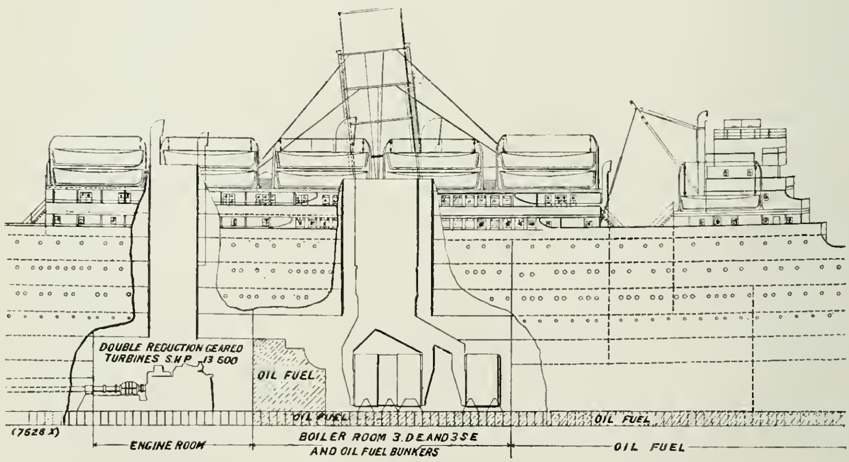
Elongation in conjunction with contraction of area is probably the best criterion of the quality of the steel.

For the wheels of the gearing, apart from the pinions, ordinary carbon steel is performing well, and there does not, as yet, appear to be any necessity to incur the extra expense in making these large parts of alloy steel. There are a number of steelmakers who have all the plant, skill, knowledge, and data to produce reliable alloy steels which will fully meet the case. This subject has been so fully discussed recently that the efforts which will now be put forward will surely be successful in advancing the art of marine engineering to that plane where full advantage will be taken of the improved materials offered. Unfortunately, until full confidence is re-established, excessive conservatism in design is bound to be the rule, but in time the engineer will be able to utilise completely the better qualities of material regularly available.

Especially will this be the case when metallurgical knowledge is less rare. It is to-day quite insufficient to judge steel merely by the eye or the ultimate tensile strength and elongation. Science has



SPACE REQUIRED BY 11,500 S.H.P. QUADRUPLE-EXPANSION RECIPROCATING ENGINES AND COAL-FIRED BOILERS.



SPACE REQUIRED BY 13,500 S.H.P. DOUBLE-REDUCTION GEARED TURBINES AND OIL-FIRED BOILERS.

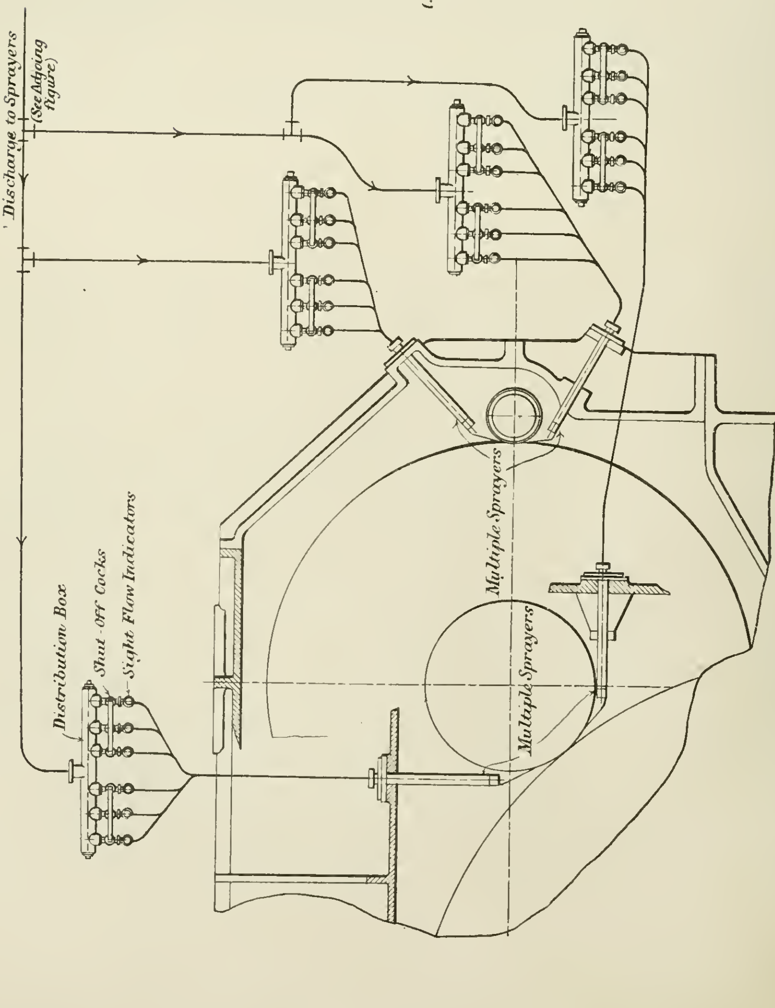
advanced far beyond this stage, and this question of gearing steel has made many engineers resolve to study and become familiar with the metallurgical side of the science of steel manufacture, at least to the end that they may be able to approve a selection of the most suitable steel for the purpose in view and to judge of the quality offered. It is pleasant to record that the engineering courses at most of our technical colleges and universities are taking full cognizance of the increasing importance of metallurgy and are incorporating a study of the science in their courses. The action of Messrs. Alfred Holt & Co. in establishing at Liverpool University a chair of metallurgy with special reference to marine engineering is a generous move equally in the right direction.

With fuller metallurgical knowledge, many simplifications in gearing will result, more particularly in respect to the lubrication arrangements, including tell-tales, double coolers, batteries of nozzles, connecting pipes, cocks, oil overflows, etc. This point will be made clear by reference to the diagrammatic arrangement drawings given on p. 238. The theory of lubrication is sufficiently definite on the point that once an oil-film is present it will not readily be destroyed, so that the simpler arrangements for maintaining an oil-film on the teeth will be adopted in future gearings.

Sufficient oil must be circulated to carry away the generated heat, and if this condition is fulfilled it is difficult to see how an oil-film for the teeth in contact can be lacking.

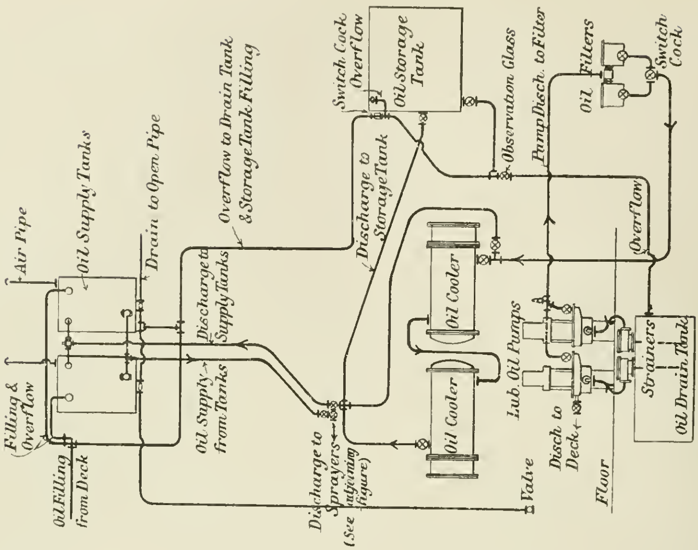
The Future of Double Reduction Gearing.

Double reduction gearing has definitely come to stay; whether or not it is the final solution to the problem of obtaining the best results from both the turbine and the propeller is doubtful. With an average set of double reduction gears the teeth of the second reduction pinions only transmit loading during 2 to 4 per cent. of their running time, whereas with the main gear wheel the percentage is less than 1. It must be matter for reflection as to whether such a relatively clumsy solution can be regarded as other than a passing phase. Meantime it fills a gap, especially for the large class of vessels of the intermediate liner type, where reversion to triple or quadruple reciprocating steam engines could only be made by sacrificing much valuable space to the detriment of the earning capacity of the vessel. This is evident from an inspection of the diagram on the Plate facing this page. The majority of shipowners realise that they are partners with constructors in this development, and with patience and determination double reduction gearing will emerge as a satisfactory marine propelling plant in its own sphere. There are many other points in connection with this subject which might be touched upon, as for instance the relative claims of the 3-gear box and the "interleaved" arrangement (see p. 216 of last year's "Annual"), the provision of increased flexibility of drive for the gears, as with the nodal and quill drives; but it is felt that these are all subsidiary to the main questions, which have been somewhat fully treated.



(7528.L.)

DIAGRAMMATIC ARRANGEMENT OF METHOD OF SPRAYING LUBRICATING OIL ON GEARING.



(7528.K.)

DIAGRAMMATIC ARRANGEMENT OF LUBRICATING SYSTEM FOR FORCED FEED SUPPLY TO GEARING.

Reciprocating Steam Engines.

The sphere of double reduction gearing is certainly limited. For powers below 4000 to 5000 steam I.H.P., the rival claims of the steam and Diesel reciprocators alone need be considered, as double reduction gearing has not fully substantiated its claims in this field, and if steam is to be the motive power, the simple triple or quadruple expansion reciprocating steam engine with superheat and modern auxiliaries is considerably less in first cost and generally is equally economical in operation. Moreover, it has one characteristic all its own. It has very truthfully and tritely been remarked that it remains the one type of marine propelling plant which the builder can hand over to the owner with every assurance that he will never hear any more about the machinery.

Steamers' Auxiliaries.

Consequent upon this position, increasing attention is being focussed upon the auxiliaries, which it is now realised consume a very considerable proportion of the total steam generated. For auxiliaries, the simple single cylinder steam engine, which is uneconomical, is being displaced by the compound engines where the power is of moment. As an alternative a range of single cylinder vertical engines on the uniflow principle, *i.e.* with a central port exhaust, have been developed. Steam inlet is controlled by a slide valve and the difficulty of drainage with uniflow engines, which has hitherto confined them to the horizontal type little suited to the major portion of the general duties on board ship, has been most neatly overcome by the provision of a lower compression chamber. Results to date indicate that very considerable savings are possible by the adoption of such means.

The only other question coming under the heading of steam auxiliaries, to which it is desired to draw attention, is the subject of dealing with the exhaust side of the steam installation. The effects of the nature of the condensate upon the deterioration of the interior surfaces of the boiler are admitted, and it may now be stated that the discharge of condensate from the condenser direct to the boiler does not fully meet modern requirements with regard to the prevention of corrosion. This subject is now receiving very careful attention.

Coal Handling.

The handling of coal in shore plant from the railway truck right into the furnace of the boiler is a highly developed mechanical art, and it is reasonable to predict that the difficulties which have beaten experimenters in the past, in their efforts to develop a means for obviating hand trimming and stoking aboard ship will not prevail. Whenever times again permit, increased endeavour will again be made in this direction, and finally success will be achieved.

In certain continental ships mechanical stoking with water-tube boilers is meeting with a very promising degree of success.

The Diesel Engine.

Strong and unquestioned as is the position of the reciprocating steam engine in the cargo carrying marine, such has been the recent progress with the marine Diesel oil engine, that in considering this latest prime mover, we are dealing with the one serious rival to-day to the steam reciprocator. The claims of oil fuel at sea have been fully dealt with in previous issues of the "Annual" and are admitted. It can now definitely be stated, however, that, except in special cases where oil is relatively very cheap, the burning of the liquid fuel under boilers is uneconomical. The advantage, which still holds in the case of Atlantic liners, has not now, with reduced wages, sufficient potency with the lesser powered and slower cargo carrier to warrant the extra first cost of machinery and the higher price for fuel.

The claims of the oil engine have been recently further intensified by the troubles experienced of late with double reduction gearing and in every way its position is gradually and surely strengthening. There are now available to the shipowner more types of oil engines than ever previously. Hitherto a reasonably full measure of success has been limited to those types of internal combustion machinery where conservatism in design and construction has been the keynote, but to-day newer developments on a bolder scale are gradually proving themselves at sea.

The one consideration determining the power output of the larger internal combustion engines is the heat flow factor. Hitherto the effect was to restrict the mean effective pressure in the working cylinders and the piston speed. The heat flow factor expressed in pounds of fuel per unit of time per unit of surface of the combustion chamber volume is determined by the mean pressure and the piston speed. The advances which have recently been made in design and materials, but particularly in design, permitting of higher powers per cylinder, are now enabling designers to increase the rating in respect of mean pressure and piston speed. The heat flow factor has been reduced by improved cooling of the combustion chamber surfaces. The circulation of the cooling medium is now controlled to the end that maximum speed of flow, and therefore full heat transfer, takes place coincident with the highest heat generation. The tendency with large powers is to adopt fresh water instead of salt water cooling. This obviates the possibility of local heating, and therefore overstressing, due to particles of salt or sand always present when salt water is used, and particularly so in certain waters. The extra complication of coolers for extracting the heat from the fresh water and of circulating pumps for these coolers is a minor item compared with the extra security so attained.

Powers per cylinder are gradually being advanced and 500 B.H.P. per cylinder will not be uncommon in the near future with the largest type of motor ship. The tendency with single screw ships is to reduce the speed of revolution in order to attain a higher propeller efficiency.

To keep down machinery weights and to secure a built-up, as

opposed to a solid forged, crankshaft, long-stroke engines with a high piston speed are being adopted generally. Above 2000 B.H.P. or thereabouts, there is an excellent case for retaining the twin screw arrangement of machinery with all internal combustion machinery, since broadly and theoretically it can be stated that the power increases as the square of the linear dimensions, whereas the weight advances as the cube—the higher the power of the engine, the greater the weight, space occupied, and cost. Therefore, for a given horse-power, a smaller, more compact, and cheaper arrangement is provided by twin screw machinery. The gains in the machinery are offset to some extent by the necessity for providing for two tunnels and the extra bossing at the stern for the two shafts. There is added security with two engines. The one drawback of moment is the increased personnel necessary for handling, manœuvring, and maintaining two as against one engine. For the higher powers the twin screw arrangement is to be advocated.

Oil Fuel Supplies.

There is little fear that the oil fuel supply will not meet the demand. The prices ruling for coal and oil have kept, within recent years, a very fairly constant ratio, and recently, if anything, oil has tended to become cheaper. Our dependence upon entirely foreign sources of supply is being lessened by the very great and recent development of the Anglo-Persian group controlling British oil fields, a large fleet of oil carriers, one of which is illustrated on the Plate facing p. 231, and very extensive distilleries and refineries in South Wales. One general tendency, however, due to the high prices ruling for lubricating oils and the higher motor spirits, is the deterioration in quality of a considerable portion of the fuel oil supplies coming on the market, owing to the maximum distillation of the crude oils to extract as high a percentage as possible of the high priced components. Tests carried out ashore, followed up by actual experience under normal seagoing conditions, have recently gone to prove that the marine Diesel oil engine is not nearly so sensitive to varying qualities of oil fuel as was formerly believed to be the case and that low grade oils can be successfully consumed.

Whether the lower cost of fuel will be balanced by the extra maintenance charges, which may well be called for when using low grade oils, yet remains to be proved, but emphatically the capacity to burn such oils successfully and economically, at least on occasions, is an added asset with this type of engine, and will unquestionably be a necessary requirement to be fulfilled by oil engines which are installed aboard tramp steamers for which a regular supply of the higher grade oils cannot be pre-arranged, and which may require to bunker in some ports with any oil which may be obtainable.

The shipowner has fewer doubts as to the capacity of the oil engine. The three factors of the first cost, personnel, and upkeep are still regarded, in some quarters, as deterrents. The first cost for similar sized steamers and motor ships is said to be much in favour

of the former. This requires consideration. A smaller motor ship will suffice because of the saving of space due to the type of machinery, principally in bunkers, in increased radius of action per ton of fuel (although a motor ship must generally carry more fuel than a coal-fired steamship to get full advantage of favourable fuel markets) and decreased personnel. In inviting tenders, shipowners would be well advised in order that they may accurately assess the position of the motor ship to state simply the duty of the ship and the sea speed required, leaving the contracting naval architect and marine engineer to decide the best combinations of features to meet the requirements at the minimum first cost. Such are the advantages of the motor ship, especially on many important trade routes, that the extra first cost is quickly written off.

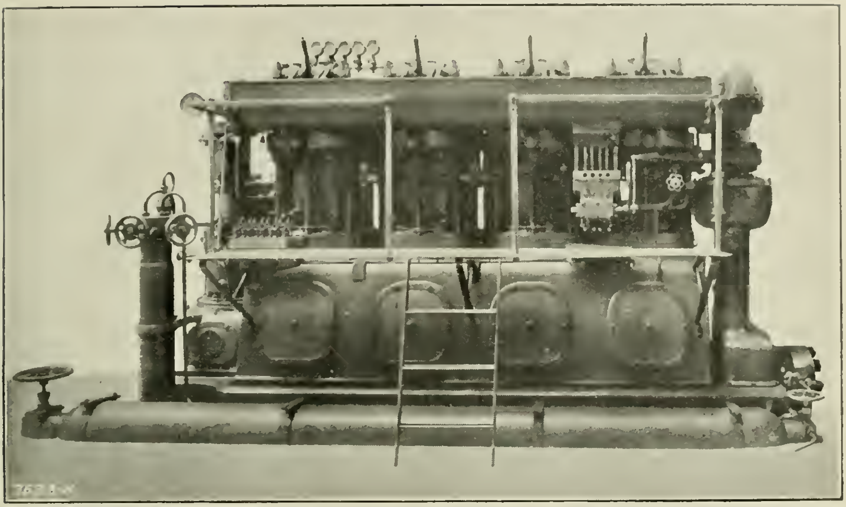
There is now available an increasing number of engineers conversant with the first principles of internal combustion, and most engine builders are only too anxious that their engineers who have worked on the construction of the machinery shall follow it to sea and form the nucleus of the engine-room complement. Under such conditions the fears of excessive upkeep expenses are not well founded.

To-day at sea the tonnage of motor ships is 6·5 times what it amounted to in 1914, and of the present total, more than one-half, or 848,000 tons, represents 149 vessels of over 3,000 tons.

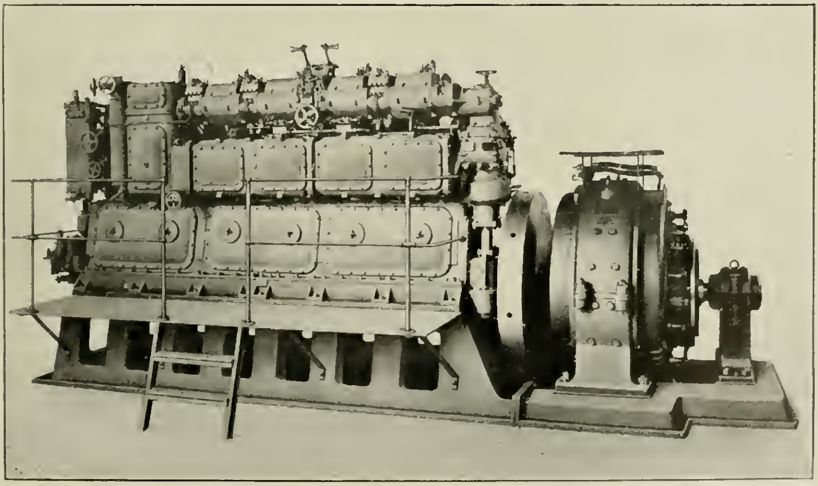
Motor Ship Auxiliaries.

With the successful development of marine oil engine machinery as described, the auxiliaries on board motor ships are receiving greater attention. It is safe to state that the auxiliary machinery to-day, in the case of many motor ships, is the cause of more anxiety than the main propelling units, and therefore this subject may be somewhat fully dealt with. Auxiliary duties comprise the services for the main engine—manœuvring air, standby for injection air, lubricating oil, cooling water for the cylinders and heads and main pistons, and fuel oil supply, and for the ship, bilge and ballast pumping, ship's lighting, cabin heating, and heating of oil fuel if the heaviest oil is used for the main engine. Tanks also must be steamed out if oil is carried as cargo. Steering gear, capstan, windlass, and the winches for handling cargo, as well as generally a refrigerator for food storage have also all to be legislated for. A number of the pumps for supplying the main engine can be driven from the main engines, although in any case standbys will be required to serve to prime through and test the services prior to starting up the main engines.

There are two main methods of supplying the auxiliary power, firstly, by electricity generated by Diesel-driven dynamos, or by steam provided by oil-fired donkey boiler or boilers. There may be a combination of both systems. All of the duties enumerated above, excepting the heating of the oil fuel, can be carried out by either method. Electrical means for this purpose have not yet been perfected; the oil-engine exhaust heat can be utilised for heating the



TOSI AUXILIARY DIESEL ENGINE. 133 KILOWATTS OUTPUT.



SULZER AUXILIARY DIESEL ENGINE. 300 KILOWATTS OUTPUT.

oil. The steaming out of oil-fuel tanks, to cleanse them, if it cannot be carried out from the shore, necessitates a boiler or boilers.

The enormous amount of heat in the large volume of low temperature exhaust gases which passes away will undoubtedly, in time, be harnessed to do a considerable percentage of useful work. The problems associated with the condensation of the exhaust gases from sulphurous fuels will not be easy of complete solution, but if steam were raised in this way for oil fuel and cabin heating, and perhaps also for operating the steering gear and the whistle, an advance would be made, and it would be an economy. Certain motor ships which will shortly be put to sea will have such a system, and their operation will be watched with close attention.

The Cost of Auxiliaries.

This subject of auxiliaries may be regarded from the point of view of: (*a*) The minimum first cost; (*b*) The lowest operating expense; (*c*) A compromise between (*a*) and (*b*). From the minimum first cost standpoint the adoption of all steam auxiliaries is the solution. In such case as many as possible of the auxiliaries should be driven from the main engines to keep down the consumption of oil required to drive the various machines. Even then the steam required to perform so many important duties will call for two relatively large donkey-boilers taking up much valuable space, and their consumption of fuel will be such as very seriously to impair the overall economy of the main propelling engines.

There remains to be discussed a compromise between minimum first cost and minimum operating expense. Such a solution is, for instance, the use of electricity at sea and steam in port. No boilers are required at sea, unless for cabin heating. The steering gear, engine-room pumps and ship's lighting are all supplied with power from Diesel-driven electric generators. Steam, however, is used exclusively on deck for capstan, windlass, and winches. This system is considerably less in first cost than the all-electric system, and is not so uneconomical in fuel as the use of steam for all the auxiliary duties.

In the case of oil tankers the necessity for the provision of steam generated on board requiring relatively large boilers for this duty, has retarded the application of the oil engine for the propulsion of this type of vessel owned by those whose livelihood is made from oil and whose aim is to encourage its uses. One requirement with most oil tankers is the ability to "turn round" quickly, and doubts are still harboured as to the suitability, in this particular respect, of the Diesel as compared with steam plant. Time will allay such fears, and steam raised from exhaust gases may yet be utilised for steaming out the cargo tank. The suitability of the Diesel engine for driving oil tankers would then be enhanced.

By far the most economical system from the point of view of working costs is the electrical drive, Diesel-driven generators supplying current to electric motors. Steam is only required for cabin and oil-fuel heating. For the heating of cabins, electric radiators

have been used, but are delicate and have a high consumption of current. A combined system of steam raised by the exhaust gases while at sea, and of electrically-generated heat in hot-water pipes while in port, may successfully meet the case, but no system of electrical heating of heavy fuel oils has yet been applied at sea.

Electrical Generators for Auxiliary Use.

The electrical generators should not be less in number than 3, and for reasons of interchangeability these should be of the same size. One is required for supplying the auxiliary services normally when the ship is at sea, 2 suffice for manœuvring the ship or for working cargo fully in port, and 1 always serves as a standby. For ships of 3,000 tons deadweight, 3 sets each of 50 kilowatts suffice.

Comparison of Fuel Consumptions at Sea and in Port by a Steamship and a Diesel Ship.

Steamship.

Triple-expansion engines, single screw.
Ship, 270 ft. 0 in. × 38 ft. 0 in. × 18 ft. 0 in.; draught, 17 ft. 5 in.
Voyage, London to Spanish port.
Indicated horse-power, 1,073.
Revs. per minute, 75·8.
Speed of vessel, 9·35 knots.
Coal used per day, *for all purposes at sea*, 17·42 tons.
Coal used by auxiliaries per day, 2·5 tons.
Coal used in port per day, discharging and loading, 3 tons.
Banked fires, used per day, 16 days on average voyage, 1 ton.

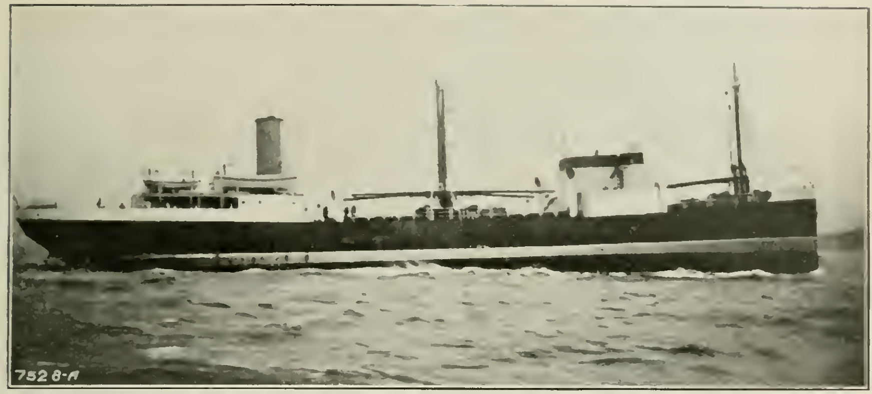
Motor ship "Pinzon."

Diesel engines, single screw.
Ship, 240 ft. 0 in. × 38 ft. 0 in. × 18 ft. 0 in.; draught, 17 ft. 6 in.
Voyage, Glasgow to Spanish ports.
Diesel indicated horse-power, 1,290.
Equivalent steam indicated horse-power, 1,170.
Revs. per minute, 106.
Speed of vessel, 10·2 knots.
Oil used per day *for all purposes at sea*, 4·5 tons.
Oil used by auxiliaries per day at sea, 0·2 ton.
Oil used in port per day, discharging and loading, 0·37 ton.

Summary of Results.

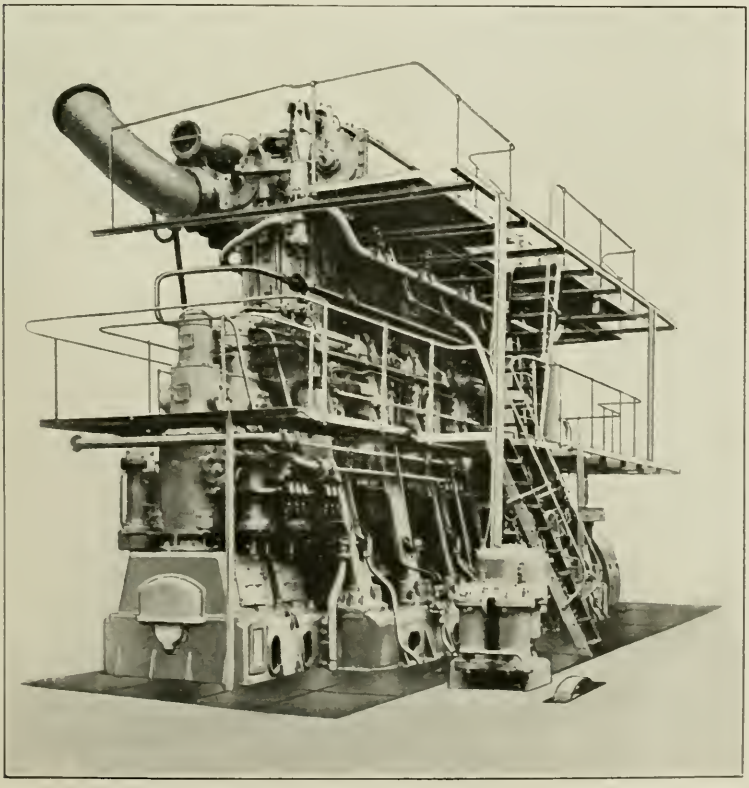
	Motor ship, oil.	Steamer, coal.	Ratio, coal to oil.
Fuel used per day, for all purposes at sea, tons . .	4·5	17·42	3·9 to 1
Fuel used per day by auxiliaries, tons	0·2	2·5	12·5 to 1
Fuel used, in port, per day, discharging and loading, tons	0·37	3 } 4	10·8 to 1
Fuel used, in port, per day, banked fires	0·0	1 }	

For ships of from 6,000 to 10,000 tons deadweight, 3 sets of 80 kilowatts to 100 kilowatts are generally required. If special provision has to be made, for instance, for carrying refrigerated cargoes, the power of the sets is increased, and in some cases, 3 or 4 sets of 150 kw. are called for. This system is elaborate, but from the table given above it will be seen that the consumption of fuel



MOTOR-SHIP PINZON.

Built and engined by Messrs. William Beardmore & Co., Ltd., Dalmuir.



1250 B.H.P. BEARDMORE-TOSI TYPE MAIN ENGINE FOR M.S. PINZON.

for working cargo and pumps in port with banked fires in a steamship is of the order of ten times the amount of fuel required by the Diesel-electric system of auxiliary working on similar motor ships. This solution then gives the minimum operating costs.

2-Cycle Engine Auxiliaries.

The foregoing refers particularly to 4-cycle engined ships where the auxiliary Diesel engines are of the same type as the main engines (illustrations of 4-cycle auxiliary Diesel engines are given on the Plate facing p. 242). When 2-cycle main engines are adopted the practice of driving the scavenging pumps separately from the main engines to permit of turbo-blowers being used for this duty will undoubtedly gain favour, and in this case the Diesel-driven generators for supplying electric current for general duties as well as to the motors driving these blowers, become of very considerable size, approximating to 25 per cent. of the power of the main engine. Two generators, each of 25 per cent. of the power of each main engine, enable one generator to be in use at a time, the other being a standby. One generator is then sufficient for cargo working. Both, however, may be required if an abnormal amount of starting air is required for manœuvring, so that it is quite possible that even larger auxiliary generators may in future be required to give a greater margin of power.

Diesel Electric Propulsion.

Such figures as 25 per cent. or more of the power of the main engines lead naturally to a consideration as to whether the correct angle from which to review and attack the problem is not to regard the machinery of the ship as a central electric power station delivering current to electric motors for propulsion and all the other multifarious duties. For special purpose ships, where the duties apart from propulsion require a substantial measure of the total power aboard, such as, for instance, dredgers, ferry boats, cable ships, etc., the Diesel electric system merits the closest attention and is being adopted.

Electrical motors and starters, particularly the latter, have not yet been fully developed for all purposes on board ship. Especially onerous are the conditions appertaining to the electric gear on deck, exposed to sea and weather and handled often in the very roughest way. In the engine-rooms of some motor ships, the great variety of the types and sizes of starters does not conduce to the best efficiency in working, nor to the carrying of ample spare parts for replacements.

In the case, then, of the Diesel electric system of propulsion, not unreasonable doubts are entertained regarding the electrical equipment. The weight and first cost are high. The piston speed and mean effective pressure with the Diesel prime mover are limited, so that there is little incentive on this score to adopt other than direct coupling to the propeller. The case with the steam turbine is of

quite a different nature, since the coupling of the turbine to the propeller with high efficiency of each, demands the introduction of some form of gearing.

The Diesel electric system is favoured in America and is also advocated in some quarters as being one, if not the shortest, route to the attainment of very high total powers, because of the large number of units which can be accommodated to make up the total power required. This aspect of the subject of high-powered marine Diesel installations is only in embryo.

Almost every development in engineering has had, in some stage of its course, to await the production of materials suitable for its requirements, and invariably such have been forthcoming in due course. Alike with double reduction gearing, the Diesel engine in the present, so with the internal combustion turbine in the future, the question of the regular supply of suitable materials will undoubtedly retard commercial progress. The science of metallurgy as applied to commercial marine engineering is in its infancy, and it is safe to predict that, assuming the progress now being made is continued, the present types of marine machinery are only phases in the general solution consequent upon the perpetual striving for increased efficiency.

JAMES RICHARDSON.

ITALIAN ATLANTIC LINER CONTE ROSSO.

Built and engined by Messrs. William Beardmore & Co., Ltd., Dalmuir, for the Lloyd Sabaudo Company, Genoa.

CHAPTER VI.

British Shipping on the River Danube.

There is no doubt that the instinct which first created in Englishmen the love of ships and shipping arose out of the spirit of adventure which was bred by our island existence ; but however this may be, ever since commerce entered into international relationships Great Britain has taken an active part in the provision of transport facilities, which may be described as the jugular vein of international commerce. To most of us, international commerce means *overseas* commerce, and we look upon the seas as being the highways of international commerce. Having no great rivers of our own and living on an island we are perhaps sometimes apt to pass over with a light thought, even if we give them a thought at all, the great inland waterways of Europe, of which the Danube is the chief. In comparison, the Thames sinks almost into insignificance, being only 225 miles long, whereas the Danube is some 1,750 miles long, and while the Thames separates or passes through nine English counties, the Danube passes through and provides an outlet to the sea for nearly as many different nationalities. Rising to the south of the Black Forest, it ultimately discharges into the Black Sea, and is navigable for large barges from Ratisbon in Germany, through Austria, Hungary, Czecho-Slovakia, Yugo-Slavia, Bulgaria, and Roumania, and for several of these countries having no seaports of their own the Danube provides the only natural outlet to the sea.

Disastrous Effects of the War.

To no other river in Europe does quite the same significance attach, and it was because of its great importance from the point of view of international commerce that in the Peace Treaties of Versailles, St. Germain, and Trianon the river was declared international from Ulm in Germany to its mouth, which covers the whole of its navigable length. Traffic is principally carried on by barges ranging up to nearly 1000 tons capacity, which are towed in groups by paddle steamers or tugs of special construction. Motor barges are also being increasingly used, and fine large passenger vessels maintain regular services throughout practically the whole stretch of the river from Passau to the sea. The largest of these vessels, which run at the present time between Vienna and Belgrade, accommodate between 1200 and 1300 passengers, and perform the " voyage " in about 36 hours (or 54 hours between Belgrade and Vienna against the very strong current), passing alternately through some of the busiest industrial centres and some of the most beautiful scenery.

Prior to the war the shipping on the Danube was owned principally by the Austro-Hungarian companies, who, along with the German companies, built up an extensive organisation of warehouses, landing pontoons and other facilities throughout the river, and on the outbreak of the war the Danube route was quickly recognised as a valuable means of transportation, and was extensively used by the Germans, both for moving war materials for their armies, and food for their civilian population. At the end of the conflict the Danube was left in an almost complete state of chaos. Hundreds of vessels were sunk and a great many were detained by the Allied States bordering the lower reaches of the river, principally Yugo-Slavia and Roumania, and these vessels were immobilised for all practical commercial purposes pending inquiry by Prize Courts into the circumstances of their seizure. In any case, for a long time after the Armistice there was practically no trade passing between the Danube States, all of which without exception had been directly involved in the war. The big shipping companies of Austria-Hungary were paralysed by the break up of the old Empire, and the internal troubles which followed. Hungary experienced a period of Bolshevism, and for a time the absence of any stable authority on the river made the resumption of trade a matter of great danger and difficulty. A British flotilla had been sent up the river under the command of Admiral Sir Ernest Troubridge, and efforts were made to restore order and confidence, as it was realised that a return to ordinary trading conditions would go far towards resettling the surrounding countries, which for years past had been a kind of stormy nerve centre. The difficulties, however, were immense, and very little progress had been made in restarting the Danube shipping by the spring of 1920, when a group of British capitalists was approached with a view to helping forward the organisation. As a result a large amount of capital was privately subscribed for the purpose of acquiring entirely one of the German shipping companies and taking over a large interest in the principal Austrian and Hungarian companies, and with the assistance of this new capital and the organisation set up by this British syndicate, chaos has gradually given place to order and confidence.

International Interests.

It may safely be said that the whole organisation of the river has been radically changed by the Peace Treaties, as apart altogether from the vast amount of shipping which changed ownership as a result of the prize seizures and subsequent condemnations, the Allied States claimed that they should be made independent of foreign shipping for their legitimate trade needs, and subsequently it was decided to appoint an American arbitrator to redistribute the whole of the Danube fleets between the various nations. This in actual practice meant more than anything else dividing up the Austrian and Hungarian fleets between the State of Czecho-Slovakia and the Kingdoms of Serbia and Roumania. It may well be imagined what a colossal task this proved to be, but by the opening of the navigation season of 1922, the work of redistribution had practically been

completed, and at the present time the fleets are divided in approximately the proportions given in the following table:—

	Passenger vessels.	Percentage of passenger vessels.	Tugs. H.P.	Barge tonnage.	Percentage of barge tonnage.
Roumania	17	20·00	30,835	445,264	33·35
Serbia	19	22·35	34,404	396,347	29·69
Czecho-Slovakia	2	2·35	5,550	70,861	5·32
Austria	31	36·47	21,760	230,954	17·30
Hungary	16	18·83	17,340	144,169	10·80
Germany	—	—	2,600	40,717	3·05
Bulgaria	—	—	—	6,598	0·49
		100·00	112,489	1,334,910	100·00

By this redistribution the legitimate trade requirements of the respective nations have, as far as possible, been provided for, and whilst part of the tonnage has been brought about by war captures, the remainder of the vessels which have been transferred under the scheme just mentioned have been paid for in cash by the State to which they have been ceded.

Political and Economic Factors.

But whilst all these fundamental changes have been in process of adjustment, political and economic developments have tended to make the task of reorganisation increasingly difficult. It has to be realised that the vessels are all the time trading internationally, and each country through whose territorial waters they pass has a different currency—German Marks, Austrian Kronen, Hungarian Kronen, Czecho-Slovakian Kronen, Yugo-Slavian Dinars, Bulgarian Levas, and Roumanian Lei. Freights are chiefly payable in the currency of the country from which the goods are shipped, but the expenses of the vessels have to be calculated in all the different currencies, because, by custom, crews' wages, for instance, are payable in the currency of the country in which a vessel commences her voyage each day. Moreover, whilst the freights are payable in the currency of the country from which the goods are shipped, they are not actually payable until the discharge of the goods, and by that time it is always possible that the fluctuation in the exchange values may have been so great as to upset altogether the original calculations. To a large extent, therefore, the business of the Danube shipping companies has become one of highly technical finance, more particularly as with each succeeding fall in currency values prices of commodities and wages increase almost proportionately.

Until some remedy can be found for stabilising currency values it is impossible to hope for a return to the normal trading conditions of pre-war times, conditions which we now look back upon as being almost without risk. Unfortunately, it is the tragic fact that those countries which have shown either the least desire or the least

ability to maintain a measure of stability, have reaped a superficial benefit from good export trading, and consequently have no lack of employment, whereas other countries which have done their best to correct the evils of inflation have experienced great difficulty in competing for export orders, and in consequence have suffered the hardships of unemployment.

Austria's Tragic Position.

None the less, it is apparent from the situation of Austria that sooner or later ruin must follow unchecked inflation. There the crown has fallen to as little value as 400,000 crowns to the pound sterling as compared with the pre-war exchange of 24·02. The economic situation of Austria, and to a lesser degree that of Hungary and Germany, is one of the pre-eminent difficulties in the way of the establishment of the Danube shipping enterprise on a proper normal basis, and the latest of many schemes for the arrest of inflation through the establishment of the new Austrian Note-issuing Bank will be welcomed by all who have business interests in that part of the world. At present the State is maintaining an army of officials on almost as full a scale as in the days of the old Empire, and the State monopolies, with one exception, are being operated at a loss. The railways, for instance, with which the privately owned shipping is expected to compete, are actually carrying foreign merchandise at less than the cost of operation, and on a basis which is cheaper than in any other European country when the depreciated currency is taken into consideration. In order to encourage her industries, certain railway freight rates are established on a very low basis, which in effect means a State subsidy; but Austria is also compelled to carry similar foreign goods in transit through Austria at the same rates, as by the conditions of the Peace Treaties foreign goods cannot be charged higher rates than internal traffic. Can it be wondered at, therefore, that the economic situation has at last become desperate? High hopes are entertained that the proposal for the organisation of a new Note-issuing Bank will materialise, and that it will bring about the much hoped for improvement and establish a stable currency. This bank, to which it is proposed to give the exclusive right of issuing notes, is to be formed by the leading Viennese banks, and of its capital of 100,000,000 Swiss francs, 60,000,000 will be subscribed either in gold or foreign currency. This currency will be used as cover for the note circulation as well as certain gold cover to be placed at the bank's disposal by the State, including Austria's share in the liquidation of the Austro-Hungarian Bank, and remaining balances of any foreign loans, as well as Austrian Treasury notes which in turn are secured on the State forests and the salt mines, etc.

To have any stabilising effect, the issue of further currency notes by the Austrian Government must, of course, cease, and it is an integral part of the scheme that from the date of the establishment of the bank the State undertakes for a period of twenty-five years not to issue any new paper money. The success of the bank as a

commercial institution is assured, to some extent, by the State guarantee of a minimum dividend of 6 per cent. per annum, payable in gold, and this guarantee is secured on the Customs revenues. The first object of the new bank undoubtedly will be to bring about some stability in the value of the kronen, and if this is accomplished it will be a great step forward in the direction of restoring confidence in trade between the Danubian countries.

The Spirit of Internationalisation.

To an impartial mind, however, the great hope for the Danubian countries lies in the real fulfilment of the spirit of internationalisation, which caused the Powers to declare the river international from Ulm to the sea. It has been expressly declared that the object which it is thereby hoped to achieve is to give equal opportunities and equal freedom to trade to all the riparian States, and herein lies the great chance for the Balkan States to lay aside all the mistrust and jealousy which has hitherto held them back in their natural and proper development. Unfortunately, the Peace Treaties, either by accident or by intent, leave open the door for a continuance of a policy of insularity, as whilst on the one hand the river is declared international—which surely means equal rights, equal freedom, and equal opportunities for the vessels flying the flags of all nations—on the other hand, subsequent clauses of the Treaties stipulate that German, Austrian, and Hungarian vessels shall not be permitted to carry passengers or goods by regular services between the ports of any Allied or Associated Power without the special consent of that Power. Consequently, the ideal which is sought after is severely handicapped right at the commencement, and unfortunately some of the Allied States are only too ready to take advantage of the opportunity which is thus afforded them of displaying their narrow and short-sighted feelings of mistrust and suspicion of their neighbours.

The Commissions of the Danube.

The control of the river is in the hands of two separate and distinct bodies, the International Commission of the Danube and the European Commission of the Danube. On the former Commission all the riparian States are represented by delegates (Germany having the right to nominate two representatives), and in addition each of the non-riparian States who are represented on the European Commission (for the time being Great Britain, France, Italy, and Roumania) have the right to appoint delegates. The duties of these two Commissions are divided, the European Commission having control from Braila to the Black Sea, and the International Commission having administrative powers from Ulm to Braila. The European Commission has resumed its pre-war functions, but the International Commission is a creation of the Peace Treaties, and the British delegate, Admiral Sir Ernest Troubridge, was the first Chairman. Whilst this Commission is the outcome of the late war and the resultant Treaties, its definite constitution has been more

recently enacted by the Danube Convention, to which Great Britain, Belgium, France, Italy, Greece, Roumania, Serbia, and Czecho-Slovakia are contracting parties, together with Germany, Austria, Hungary, and Bulgaria. This Convention may almost be described as the equivalent of a Magna Charta—one of the keystones of English liberty—and the Danube Convention may equally well prove to be the keystone of the liberty of trade on the Danube. The Convention has for its object the regulation of international navigation on the river, and in its opening phraseology it appears to adopt a code of complete freedom and equality. It sets forth that navigation on the Danube is to be unrestricted and open to all flags on a footing of perfect equality over the whole course of the river, but it proceeds to make some most important reservations. It provides, for instance, that its stipulations shall be interpreted in the sense that they shall not infringe upon certain specified clauses of the Peace Treaties, notably one which provides that German, Austrian, and Hungarian vessels shall not be entitled to carry passengers or goods by regular services between the ports of any Allied or Associated Power without special authority from such Power. Thus the principles of freedom, equality of treatment, and one of the chief objects of the internationalisation of the river, have been very largely negatived. Prior to the war, the big Austrian Danube Company operated passenger and freight steamers from Vienna to Roumania, and afforded thereby a pleasant and cheap means of transportation, both for passengers and cargo; but such a service now becomes impossible, and as so often happens, the ideals that presumably were sought after by those who were responsible for drafting the Peace Treaties have not been achieved.

Intervention of the League of Nations.

The Danube Convention was completed by the contracting parties in the summer of 1921, and ratified in the spring of 1922; subsequently, the League of Nations convened a conference at Barcelona at which forty-four States were represented for the purpose of providing measures which should secure and maintain freedom of communication and of transit. The existence of disabilities, such as that referred to above, was recognised, and it was conceded that international commerce without freedom and equality of treatment, particularly in the case of a river like the Danube which serves so many different nationalities, is "at the mercy of political rivalries and is the sport of economic reprisals." "A State traversed by such a waterway could not monopolise it for its own benefit without injuring itself, as the other riparian States would exercise their monopoly in the same way;" yet notwithstanding the acceptance of these high principles, the Barcelona Convention also perpetuates the original sin of the Peace Treaty, which, on the one hand, pronounces in favour of freedom and equality, and on the other hand, ties the hands of those States which have in the past done more than any other of the riparian States towards developing and popularising the Danube route as a means of communication and transportation.

Undoubtedly, the past organisation of the Danube has been responsible for many evils, and it seems to be almost inherent in the Balkan States that jealousy, mistrust, and suspicion should reign unchecked. It is no light task to essay to bring about complete unity and concord between the various States which border the Danube, but the policy of the British Danube Navigation Company is to bring the different interests together, to encourage better relationships, to break down traditional prejudices, to introduce fresh life on the river, and to make the utmost possible use of the river's great potentialities.

A great many of the difficulties which have been referred to in the course of this chapter are the outcome of the war. A great many of them can, and will no doubt, be overcome by patience and goodwill, but unity and co-operation are in this case essential principles of a successful commercial enterprise. By co-operation and goodwill many of the pitfalls can be avoided, and many anomalies removed, and by this means only can the greatest possible advantage be taken of the great natural potentialities of the Danube, the development of which will, without doubt, have a most far-reaching effect upon the restoration of trade in Central Europe.

FREDERICK W. LEWIS.

CHAPTER VII.

Safety of Life at Sea.

The loss of the Titanic moved and distressed the world and the cry "boats for all" was a very natural result. The maritime nations met and drew up a Convention to make travel by sea safer to passengers, as well as to crews. Since that Convention was framed the war and the submarines have taught us much that we did not know in 1913, and have shown us where we ought to amend the Convention of 1914. It is impossible to deal with safety of life at sea without referring to wireless telegraphy and the regulations which have been imposed on shipowners. The question of "boats for all" and "wireless" must be considered as one problem if we seek the greatest safety of life at sea.

It has sometimes been suggested that the "safety of life at sea" divides humanity into two camps—shipowners in one camp; those who voyage (passengers and crew) in the other. In truth there is no division of interest. The shipowner is keenly concerned in safety at sea, not only as a human being whose employees and friends are at risk, but for the commonplace reason that a disaster to one of his ships and a heavy death roll is a serious blow to his prestige and position—a heavy commercial loss which he will struggle to avoid.

But it does not, therefore, follow that shipowners should at once adopt every appliance for saving life at sea which is recommended to them, however obvious its advantages may seem to those who have little actual experience of sea conditions. However expensive it may be, shipowners must examine, criticise, and if need be condemn it. More than ever if it is an expensive thing they ought to criticise it. It is their province; not merely a right, but a duty. They are the trustees for the public in a vital service. All the world over, particularly in this depressed century and impoverished continent, cheapness of transport is the life-blood of progress. If shipowners tamely submit to having unnecessary expenses put upon them, and particularly expenses which may lead to less and not more safety, then they would be fraudulent trustees of the interest placed in their hands.

What is the duty of the shipowner—what is his business? It may be said that his business is to make money. Every one, shipowner or not, likes to make money; profits are a symbol of success and a weapon for progress. But to make money is not the shipowner's business in life. Is it just to run ships? Even that statement is not quite complete. A clerk can run ships quite well—or even a Government official well. But the peculiar function of the shipowner,

PASSENGER AND CARGO STEAMER ACONCAGUA.

Built and engined by Scotts' Shipbuilding and Engineering Co., Ltd., Greenock, for the Compania Sud Americana de Vapores, Valparaiso.

the function of private industry under competitive conditions, is to run ships better than anyone else.

The Shipowner's Choice.

That is a shipowner's "business." What do we mean when we say "better than anyone else"? because that is the point we have to fix. Is it faster, or is it more safely, or is it cheaper? What do our clients, the world, really want from their servants the shipowners? The answer varies with the circumstances of the customers, the state of the world, and the conditions of the trade in which we work. Sometimes the world wants speed; sometimes cheapness. Now let us imagine a position which would force us to answer this question. In the Arabian Nights, there was a being called a Djinn, who used to appear from a bottle, and he might present himself before a shipowner. Let us imagine he does so in this year of grace 1922, and he says, "Oh, Shipowner, of the shining countenance, for your brave heart in this time of adversity, I love you and I grant you a boon. I grant you the boon to choose one of four advantages: You may either run your ship at lower freight and passage money than anyone else; or you may run your ship faster than anyone else; or you may run your ship without movement when the stormy winds do blow; or you may run your ship at a decreased percentage of risk to human life. Now, Shipowner, you must choose, but mark well if you choose wrong—and the public, your clients, are the judges—if you do not make money out of your choice, I shall return and pull you back to the pit of bankruptcy; but if you choose right, then gold will flow into your coffers and the adverse balance at your bank will be scratched out by the flowing finger."

Supposing that the Djinn made his offer to shipowners, there is not the smallest shadow of doubt that in every trade in Europe, they would choose to be able to run their business more economically. That would be their first choice and in so doing they would be acting in the interests of shippers, sea travellers and humanity at large. In various trades there would be a doubt about the second choice. Some trades, perhaps in the U.S.A. where they are comparatively affluent still, might choose a faster vessel, and others, as for example, the Cross-Channel, would choose to avoid sea sickness; but in no trade in the world as things are to-day would a considerable advantage be gained by the shipowner who could advertise that the percentage risk to human life was decreased. A Government official might say this was merely an example of the incurable levity or wrong-headedness of the public. But the Government official would be wrong. For the risk to human life in a well-managed service in peace time is so small as to be practically negligible.

That truth would never be guessed if we listened to legislators in practically every country, but when those same legislators travel they are moved by exactly the same feelings as the ordinary public for whom they legislate. They also would choose the ship that quotes the lower fare rather than the ship in which the percentage of

loss was reduced from 0·000 something to half that, and they would be right.

The Effect of the "Titanic" Disaster.

What are the statistics of safety at sea? In the nineteen years ended 1911, there were carried across the Atlantic 9,500,000 people and 85 people lost their lives from marine losses. That is as near complete immunity as you can safely get. Absence from the risk of drowning is only possible if you live in the centre of the Sahara and refuse to have a bath. If you do not go these lengths, shipowners must be satisfied, and the public must be satisfied, with such comparative immunity from loss of life as those figures reveal. In an evil hour the terrible disaster of the Titanic occurred. It had been claimed that she was an unsinkable ship, and as the same idea of absolute safety is one which shipowners now have to combat, let us remember the theory of the Greeks that when a man puffed himself up and said he was greater than God, God came down upon him, and came down hard and quick. That theory is true to-day. It was said that the Titanic was unsinkable. We learnt disastrously to the contrary. When that great ship plunged down, all the unfortunate people on board were suddenly taken from the luxury and comfort of lounges and smoking-rooms, and were confronted with death. When they came on deck they found there were no boats for more than half of them. Men lit their last cigarette and were plunged into the black, icy depths. The whole world shuddered, and quite rightly too; and we met together—all the nations of the sea—and tried to avoid such a disaster in the future. We were in the mood for penance; but, being in the mood for penance, we fell into exactly the error which the ancient Greeks condemned. We tried to build up such a wall—such a tower of regulations—that there should be no more drownings. In the dawn of history there was a great drowning disaster, and a tall tower was built to make more drownings impossible. The Tower of Babel did not fulfil the hopes of its builders: neither did this tower of regulations, which was set up after the Titanic disaster for exactly the same purpose.

Boats *versus* Rafts.

It was followed immediately by four years in which all the people who had joined together to save life, set themselves to destroy it, and much more effectively—four years in which we had more losses from drowning than the world has ever known in the same period before. We cannot go back upon that, but we can profit by it. Figures are available of the losses in three great disasters by sea, one under peace and the others under war conditions—the Titanic, the Empress of Ireland, and the Lusitania. In the Titanic the seating accommodation in the lifeboats was 1,178, there were 2,201 persons on board; 53 per cent. of them might have got a seat in a lifeboat; the percentage of loss was 68. In the Empress of Ireland the seating accommodation in the lifeboats was 1,860; the souls on board were 1,477; the percentage of loss with that much greater percentage of

seating accommodation was exactly the same to a dot—68—as in the case of the Titanic. On board the Lusitania the seating accommodation in the lifeboats was 2,605; the souls on board numbered 1,959; the percentage of loss, in spite of having a large surplus of seating, was almost the same—61. These figures were produced in a technical paper at a technical discussion, and the conclusion reached at that technical discussion was the same one that shipowners themselves have reached separately. These three disasters, differing in the number of people who could be accommodated in the boats, agree pretty nearly in the percentage of loss and agree in one other thing, that the ships had not got floating accommodation which would launch itself when the ship sank. We had great opportunities of learning about marine disasters during the war, and an account by one Captain Thompson, who commanded a Government transport, is in my mind. In June, 1918, he was proceeding with five other steamers in convoy, three of them were sunk. He has put on paper this record: "The night was dark; fresh breeze, rough sea with swell; steamer proceeding at 10 knots; sank, after being torpedoed, in six minutes. Four boats were successfully launched with their crews; three of these met with disaster. One on the port side was capsized alongside the steamer with sixteen men under it; one on the starboard was thrown in contact with the main rigging, and was capsized; another was rammed amidships by a trawler escort and cut in two, the crew of twenty-seven thrown into the water and the boat rendered useless. The crews of those damaged boats"—now this is the point—"all of them got on rafts which floated from the steamer's deck when she sank, and after about one hour on the rafts were rescued by a trawler. If the rafts had not been available, the number of men lost would have been much more. As it was, only two out of seventy-two lost their lives." That is an illuminating case, and there were many like it; in fact, that was the normal experience where rafts and lifeboats were carried. Captain Thompson added: "Rafts may not be so comfortable as a lifeboat that has been safely got away from a damaged vessel, but I would rather be twelve hours on a raft than twelve hours on a damaged lifeboat in danger of capsizing." That is a statement which every practical seaman would adopt.

Prevention of Disaster.

Prevention is better than cure. That has to be impressed always on legislators in this and every country. They seek a panacea for curing disaster, and forget that if there is a disaster the panacea fails and lives are lost; the only way to save life at sea is to avoid disaster. The first thing is to have good ships, good captains, and every possible means at their disposal for avoiding disaster. The second line of defence is to get help quickly when disaster comes, and the last and most dangerous way to escape is by getting into a boat which is very liable to be capsized, or by floating off and clinging to a raft. The contention of shipowners, as the trustees and guardians of the travelling public, is that nothing ought to be done either to endanger the safety of the ship or to hamper in any way

the getting into the water of the comparatively few boats which can in most disasters be safely launched.

If anyone doubts that prevention is better than cure, let him look back on the history of the loss of life at sea and notice that the curve of loss varies without apparently paying the smallest attention to the laws that are passed in different countries. It is rather impolite of the curve, but it seems to ignore laws. A stringent law is passed because of some serious disaster—and the disasters go on. Then there comes a time when some one working away in an office has a good idea; some enterprising shipowner puts it into force, and suddenly the curve of loss takes notice of them and drops. I am timid of claiming any credit for safety at sea for anyone except our legislators, but the curve of loss does not, fortunately or unfortunately, support their claims. The great gains in safety have not been due to any laws. The change from sail to steam was an enormous advance in safety at sea. The change from small and low-powered steamers to large and full-powered steamers was more gradual, but has been accompanied by an equally noticeable gain in safety; and in our own day we have another great epoch-making discovery —the means for calling for help—wireless. It is of rather a different order from the others. It does not, in its present state, prevent the disaster, but it decreases the loss.

Wireless and Life Saving.

Wireless is scarcely out of its cradle, but directional wireless is almost certain to come into effective use in the comparatively near future. It was well tried during the war, and proved at present not to be thoroughly efficient, in aircraft. But in a few years directional wireless will be at the command of the shipowner. When that day comes, the shipowner, both for the safety of life at sea and in the interests of his own pocket, will snatch at directional wireless which will give his captain eyes in a fog to steer clear of fixed objects, and a voice to speak to other ships which are moving, so that collision may be avoided. When wireless directs the ship, wireless will be definitely a part, and a very important part, of the ordinary equipment of the ship, and should be run by the ordinary officers and staff of the ship, the engineers maintaining and the deck officers operating it. We cannot go on having on our ships a priestcraft consisting of men who do nothing except wireless. Officers and seamen must understand wireless and realise that it is not in fact an extraordinarily difficult subject. It is something that the human brain can understand without abstaining from all other work.

What are the possibilities of wireless telegraphy as a means of life-saving? The Convention Rules were framed in order to save life at sea. They had not any right to impose any obligations for any other purpose. I think they were intended to save life at sea, but, in fact, they were drafted so imperfectly that they impose regulations which cannot help life at sea, and they abstain from doing the one thing which would really have been effective. The Rules divide ships into three classes, and they say: "The largest and most

important ships shall keep a continuous watch; the middle-sized ships shall keep a watch of middling length; and the small ships shall watch when they please." If their object was safety of life at sea, the Rules imply that the safety of the large ship is improved by keeping a continuous watch.

Of course, that is not the fact at all. If a disaster occurs, even if there is only one wireless operator on board the ship in distress, and even if he is very sleepy and tired, he would be called, and he would go to the wireless room and send out a message for help. One wireless operator is quite enough for that. What really caused the regulations was probably very simple. The big ship already carried three operators and had a continuous service for commercial and social purposes, and the Convention decided to turn a practice into an obligation. But they were quite wrong. They ought to have left as much as possible to the free play of competition and commercial enterprise, and to have restricted the obligations to the minimum.

Moreover, their rule was a bad one. They thought that if the shipowner paid a man a weekly wage and gave him nothing to do but to listen to a S.O.S. call—when, if ever, it came to him—that man would sit for eight hours in every twenty-four with the wireless instrument on his head listening for something he would hear about once in a blue moon. That belief shows an ignorance of human nature. Protection cannot be obtained in that way. If every ship had three men so engaged with no commercial business on the wireless instrument, and no duty except to sit and listen for something which very seldom came, they would not be there when they were wanted. Every one knows that it is not easy to keep men at their jobs even if they have got work to do, but to keep men constantly tied to a wireless instrument in the tropics, or in the Monsoon, when there is nothing for them to do is a hopeless task. This attempt to gain safety from a human watch has broken down, as it was bound to break down.

However highly trained the man may be who is sent to sea to listen day after day, week after week, and do no other work, he will very soon get demoralised by idleness, he will be no use and a danger to the discipline of the ship. This sounds like a deadlock, but in the Rules themselves an automatic alarm signal for taking these calls was mentioned. All the firms who supply wireless in this country are agreed that it would be easy to change the alarm signal so that it could be taken on an automatic device. But unfortunately the change has not been made, and we must still decrease our safety at sea and increase the cost of living on land by employing a human watch at sea.

In boats and in wireless the shipowners ask for efficiency and less red tape—for regulations that were made before the war to be examined again in the light of our new experience by men who are free from the itch to "regulate," for our rulers and governors to remember that the oversea trade of Europe is fighting for its life. We ask for less trust in inspectors and for confidence in the great principles on which private enterprise has built so well.

Resolutions of the International Shipping Conference.

At the International Shipping Conference, held in London on November 23, 24 and 25, 1921, under the Presidency of Sir Owen Philipps, the following resolutions on life saving at sea were passed on the motion of Sir Alan G. Anderson, seconded by Dr. Knottenbelt (Holland):—

"That this Conference, representative of the shipping industry in every part of the world, approve the following principles as the basis of any further consideration of that part of the problem of safety of life at sea which more particularly relates to life-saving appliances:

1. *Boats and other buoyancy apparatus.*

(*a*) Safety of life at sea depends upon the care of the navigator and upon the type and design of the vessel much more than upon life-saving appliances.

(*b*) The stability and seaworthy qualities of the vessel itself must be regarded as of primary importance and every other provision made against possible disaster must be subordinated to that primary consideration.

(*c*) In regulations providing for boats and other life-saving appliances, it is essential that the safety of the vessel itself should not be impaired and that her decks should not be unduly encumbered, and that prompt handling of those boats which are adequate for all but extraordinary and exceptional disasters should not be hampered by the provision of additional boats.

(*d*) That ocean-going passenger vessels, as defined in Article 3 of the Convention of 1914, should carry life-saving appliances for all on board, which should consist of both boats and buoyancy apparatus; the number of boats should be the greatest which can be carried under davits with due regard to the safety of the vessel and the prompt handling of such boats; it is undesirable to formulate hard-and-fast rules for the design of buoyancy apparatus, each of which should be considered on its merits so as to afford the greatest possible scope to shipowners, their naval architects and shipbuilders to devise efficient apparatus and to provide for the stowage of such apparatus in a manner best calculated to obtain the object in view.

2. *Wireless Telegraphy.*

(*a*) That inasmuch as International Conventions become valueless if any contracting Government applies different rules, whether less or more severe, to all ships visiting her ports, the attention of Governments signatory to Convention should at once be called to instances in which the international accord of the Convention has been disturbed by particular regulations in order that the disturbance may be removed.

(*b*) So long as any merchant ships are compelled to carry wireless, it is essential that the condition of a free market in installations should be maintained.

(*c*) The legal obligation to install wireless telegraphy on merchant ships is justified only by the desire to save life, and shipowners should be left to complete freedom to deal with the improvement or amplification of their wireless installation for commercial purposes or for the convenience of passengers.

(*d*) As the introduction of wireless telegraphy has revolutionised the problem of saving life at sea, and as it has already been proved that the attempt to maintain constant communication by human agency is not only extravagant but cannot be made effective, an automatic alarm device should as soon as practicable be approved and permitted to take the place of the human watchers as provided in Article 34 of the Convention 1914, and if necessary for this purpose, the International Code should be altered in order that the alarm call can be taken by an automatic device.

(*e*) The legal obligation on ships which are compelled to carry wireless should be limited to the efficient operation of wireless for life-saving emergency, and a limited knowledge of wireless sufficient for these life-saving duties should be a qualification for a certificate to be held by a member of such ship's company, so that no idle men will have to be carried to fulfil this exceptional duty.

ALAN G. ANDERSON.

CHAPTER VIII.

Economic Aspects of the Modern Cargo Steamer.

In the present state of worldwide commercial depression, when fully 10 million tons of foreign-going shipping are lying idle, there is a strong tendency to concentrate upon trying to find employment for existing ships, even although many of them are approaching obsolescence, rather than to give due regard to the advantages which would be forthcoming from new vessels with modern machinery and appliances.

Under such trying conditions of trade, it is only natural that an obtuse feeling should exist, but with very little reflection or analysis it is obvious that an abnormally large proportion of tonnage is in existence to-day which, under pre-war conditions, would long ago have been consigned to the scrap heap.

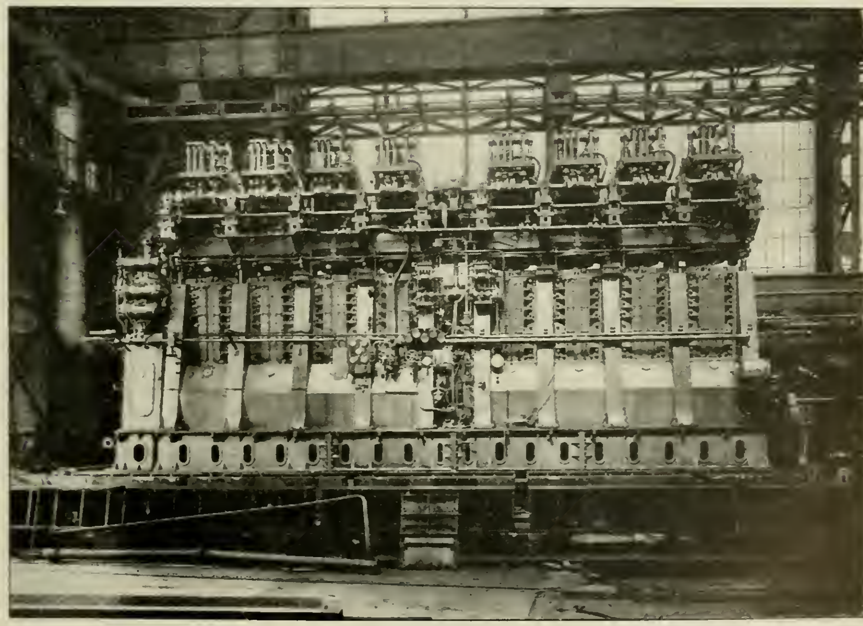
The primary reason for the extended life of many of these old ships is that they changed hands at a very high price during the war, or after the war, when tonnage was scarce and freights still high.

The position of these ships, with regard to values, is very different to-day, as, on account of heavy repair and fuel bills and the inadequacy of their cargo-handling appliances, they are generally outclassed by more modern vessels whose values have been written down to reasonable amounts.

On the other hand, it must be remembered that the present shipping charges, due to the present cost of construction, are still in excess of the yield from working the vessels. This objection, however, is being corrected rapidly. For example, during the past eighteen months, the cost of steel plates and bars has dropped from £27 to £8 10*s*. per ton, and the output of construction per unit hour has considerably increased, which, in conjunction with lower rates has reduced labour costs by about 55 per cent. The opposing factors are therefore rapidly coming into line.

I refrain from stating the ultimate results of the reductions which I have just mentioned in terms of pounds sterling per ton of deadweight, because they constitute a statical factor which has never been even a roughly true measure of earning power for varying conditions and developments. For instance, it is known that the building cost per ton of deadweight for a 10,000-ton ship would be much less than that for a ship of 3,000 tons and similar speed, and yet if two such ships were working at ordinary despatch speed, and on the short run between Hull and Hamburg, the smaller one would be considerably more profitable. It is also known that in cases where the advantages of despatch speed are unlimited, it would be highly lucrative to fit

MOTOR-SHIP HAURAKI OF THE UNION STEAMSHIP CO., NEW ZEALAND.



ONE OF THE TWO 2000 B.H.P. MAIN ENGINES FOR THE M.S. HAURAKI.
Built by the North British Diesel Engine Works (1922), Ltd.

more elaborate cargo-handling gear although its additional cost would increase the rate per ton deadweight. Such arguments can be applied to many other phases of development and particularly in connection with the new types of machinery now available. For example, there are types of heavy oil engines which, while increasing the statical cost of a ship by about 25 per cent., would enable it to be worked profitably at a freight rate very considerably less than a similar ship with reciprocating steam engines and coal fuel.

It has often been remarked, and with truth, that British prosperity is very largely, if not wholly, dependent upon shipping and shipbuilding, and the following statistics relating to the present international position have a very important bearing upon the economics of the modern cargo steamer and the influence of post-war conditions.

In 1914, Britain owned 43·8 per cent. of the world's sea-going tonnage and in 1920 the ratio was reduced to 35·1 per cent. Prior to the Great War, Germany was her greatest competitor and had a proportion of 11·9 per cent. in 1914, but held only 0·81 per cent. in 1920. America held only 4·81 per cent. in 1914, but possessed 24·1 per cent. in 1920. Germany may ultimately regain a large proportion of her shipping losses, and that, coupled with the advances made by America and Japan, will make competition even more keen than in the past.

In order to regain and maintain her former relative strength, Britain must therefore investigate and test every means by which efficient, cheap, and rapid transportation can be effected. Some investigations may bring disappointing results, but many sound proposals in the past have not been given such study and trial as they deserved.

In estimating the earning power of a ship, it is customary to consider only the aggregate cost, but in order to detect sectional losses it would be advantageous, in many cases, to subdivide that cost under a number of headings so as to ascertain which particular part of the working was a boon or a burden to the whole structure as an investment. Separate costs are therefore desirable for—

1. Hull depreciation, insurance, repairs, and the cost due to deck officers and crew, and for tonnage dues.
2. Machinery depreciation, insurance, repairs, fuel, and the cost due to engineering and firing staff.
3. Cargo-handling appliances, including labour, whether on board or on shore.

Such a distribution will form the best basis upon which the pros and cons of possible development may be discussed.

Hull Division.

The limits of dimensions (bulk) for cargo carriers have been much discussed during recent years, and the writer has already indicated his opinion, in papers read before the Institution of Naval Architects, that the financial loss due to the increased time required in port for handling cargo is greater than the reduction in transportation charges which accompanies extreme dimensions.

A study of general conditions, and making due allowance for much quicker despatch than has been obtained in the past, suggests that no justification can at present be found for building "Home Trade" vessels of more than 300 ft. long. A long distance 10-knot ship should not be more than 400 ft., while a cargo liner of 14 knots should not exceed 480 ft.

In naming these lengths it has been assumed that the vessels will work under restricted port conditions, but in many cases it is found that shorter vessels lend themselves better to the berthing facilities available, thus obtaining a quicker "turn round," which is one of the many good reasons why smaller ships are often preferable.

Hulls of cargo ships are designed for carrying three distinct classes of cargo, viz.—

1. Deadweight.
2. Bulk.
3. Deck cargoes, during certain seasons, in combination with deadweight or bulk.

The types most favoured by designers for these purposes are respectively the flush decker, the shelter decker, and the well decker. During the past three years, both of the leading classification societies have revised their rules, with the result that the structural requirements for these types are now so well known by designers and classification societies, and their weight, cost, and ultimate yield in efficiency for best methods of production are so much alike for present systems of construction that no great improvement can be hoped for structurally, except in producing designs which will require less upkeep or give reduced obstruction. When mentioning that new structures will require less upkeep, it is not suggested that this will necessarily prolong the life of the vessel: design and trading requirements change so rapidly that ship types are liable to be outclassed in a limited period of time.

Considerable advances have been made recently in the plant for constructing and erecting hulls, which should tend towards rapid output and reduced cost of construction. The overhead cranes, which are now so common in shipyards, are an outstanding example in this respect, and these have encouraged systems of erecting which were previously impossible.

Consideration should be given by shipowners to the present Tonnage Laws which are practically international and have been applied in almost their original state since the beginning of the steamship era. If these were arranged on a just and equitable basis, the average cargo steamer, and particularly those carrying better class cargoes, would probably be in a more favourable position. Ships of low power with improved types of machinery could also be built without fear of the penalties which presently threaten them.

The draft restrictions which owners generally impose on designers, are a matter well worthy of further consideration, and limitations should be most carefully investigated before a decision is reached. The draft of the average tramp steamer is restricted to, say, 24 ft., by reason of depths at probable ports of call, but is it certain that these ships

will not sometimes lift cargo at ports where the draft is unlimited, and that the benefits which would accrue from their ability to load deeper in such cases, would not more than outweigh the small extra cost of providing for such a possibility?

In an ordinary 400-ft. cargo steamer, the effect of altering the dimensions with the above object in view would be as illustrated in Table I.:—

Table I.—Effects of Altering Dimensions of Cargo Steamers.

	A. Orthodox Dimensions.	B. Length increased by 10 ft.	C. Breadth increased by 3 ft.	D. Depth increased by 3 ft.
Dimensions	400′ × 52′ × 29′ 8″	410′ × 52′ × 29′ 8″	400′ × 55′ × 29′ 8″	400′ × 52′ × 32′ 8″
Draft	24′ 0″	23′ 10¾″	24′ 0″	26′ 0″
Displacement	11,150	11,450	11,800	12,080
Service H.P.	2,100	2,160	2,200	2,200
Light weight	3,110	3,220	3,260	3,240
Deadweight	8,040	8,230	8,540	8,840
Initial Cost	£152,000	£157,800	£159,600	£159,000
Cost per ton	£18·9	£19·15	£18·67	£17·92
Per cent. difference from "A"	—	1¼ % (Increase)	1¼ % (Decrease)	5 % (Decrease)

Considerable reductions in the resistance of cargo ships have been effected since experimental data from models has been obtainable. These tests have generally been made in still water, a condition which fairly represents sea-going conditions in certain seasons, but the effect of heavy weather conditions must also be considered, and while past experiments show that it might not be profitable to modify the form of a ship for such conditions, it is believed that considerably improved speed results would be obtained by vessels designed so that the heavier cargoes can be stowed as near to midships as possible; tank experiments with models would probably give good guidance on the effect of such methods of stowage. With such a disposition of cargo, the radius of gyration would be considerably reduced, and that would carry with it a diminution of pitching, which would mean a more constant immersion of propeller, and reduced "slamming" at the fore end when running at a moderate draft. Both of these advantages would give a considerably increased speed under the conditions named, and the latter would represent a considerable reduction in upkeep.

In general practice, it is customary to assume that the best propeller is that showing the greatest efficiency under open-water experimental conditions, but it should be realised that this assumption may be far from true. Several experimenters have shown that the fore and aft position of the propeller relative to the hull endings, and also to the ship's side, have an important bearing upon propulsion, and trial trip records also show instances in which smaller, and theoretically less efficient, screws have given better propulsive results as a whole than larger ones, sometimes to the extent of fully half a knot in a 12-knot ship. This difference, which would be described

technically as improved hull efficiency, is no doubt due to the reduced interference between the blade tips and the hull, either in way of the aperture of a single screw ship or at the bossing and ship's sides in a twin-screw vessel.

There is no doubt that owners could, in many instances, further technical science by placing better facilities at the disposal of designers, and the matter of aversion from running progressive speed trials of cargo steamers in a loaded condition is an outstanding

TABLE II.—ESTIMATED FREIGHT RATES FOR VESSELS WITH RECIPROCATING STEAM ENGINES AND SATURATED STEAM.

	Speed 10 knots.	Speed 12 knots.	Speed 14 knots.
Block coefficient	0·78	0·755	0·70
Displacement	11,150	10,850	10,130
Draught	24′ 0″	24′ 2″	24′ 4½″
Service horse-power (I.H.P.)	1,850	3,150	4,880
Weight of vessel	3,010	3,185	3,500
Initial cost of vessel	152,000	167,750	190,000
Net tonnage	3,200	3,040	2,700
Crew	50	53	70
Gross deadweight	8,140	7,665	6,630
Oil per voyage	480	655	840
Stores, fresh water, and feed water	150	170	190
Net cargo deadweight	7,510	6,840	5,600
Days on run	20·8 } 29·50	17·3 } 25·2	14·8 } 21·3
Days in port	8·7 }	7·9 }	6·5 }
Number of runs per annum	12·38	14·50	17·10
Total cargo per annum	92,950	99,200	95,750
Total oil per annum	5,940	9,490	14,360
Oil, etc., at £3 per ton	£17,820	£28,470	£43,080
Tonnage dues at 2/- per ton	3,960	4,400	4,610
Wages and provisions	10,200	10,810	14,280
Depreciation. insurance, repairs (1/7 initial cost)	21,714	23,964	27,143
Total outlay	£53,694	£67,644	£89,113
Profit to give 10% initial cost	15,200	16,775	19,000
Total charges	£68,894	£84,419	£108,113
Rate per ton to give 10% profit	14/10	17/0¼	22/7¼
Management, handling, etc.	3/6	3/6	3/6
Total freight rate	18/4	20/6¼	26/1¼
Percentage freight rate with 10 knots as basis	100	112	142

example of our present defective system. It is safe to say that not more than 5 per cent. of the world's cargo ships are tested to anything nearly approximate to their loaded state, and it is as safe a statement that if loaded tests were made for all type cargo ships, the defects then detected would easily point to increase of efficiency which would handsomely repay the cost of the experiments.

The matter of increased frictional resistance due to fouling is one worthy of further research, considering that the skin friction of a freshly painted hull absorbs about 40 per cent. of the power developed

by the engine, and special encouragement should be offered to inventors who can find a more deadly poison for the crustaceous formations which can reduce speed to the extent of 3 knots in a ship 6 months after she has been cleaned and painted.

Machinery Division.

Extensive analysis shows that the most economical speed for cargo carrying is from $9\frac{1}{2}$ to 10 knots, but on account of terminal arrangements and the difficulties with high class and perishable

Diagram I.

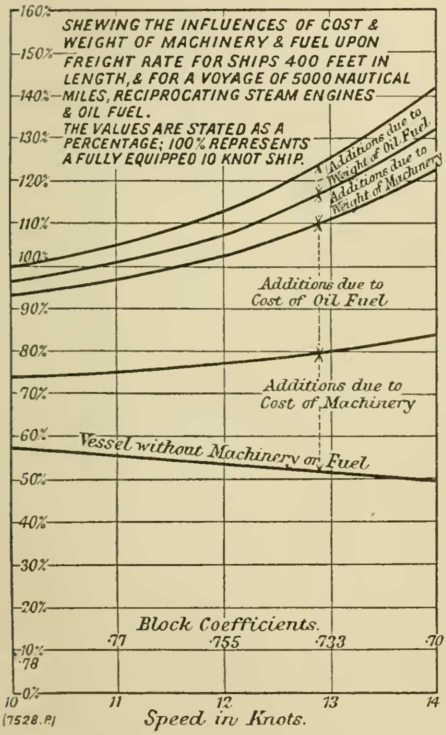
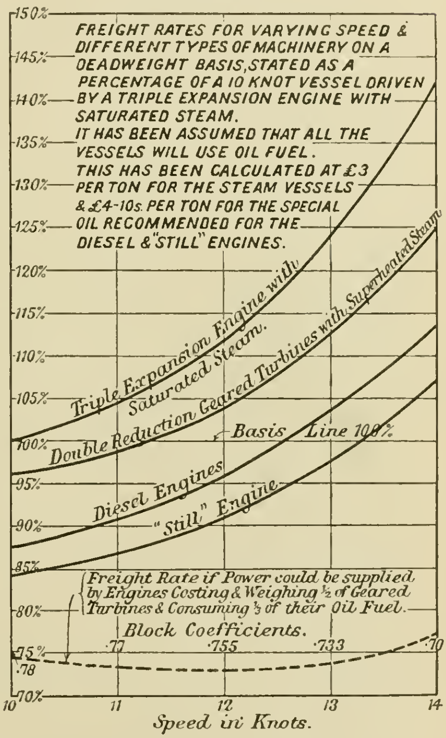


Diagram II.



cargoes, or for other indirect reasons, the tendency is for shippers to prefer faster transportation, notwithstanding the fact that it costs more.

The new types of machinery which have been developed and made practicable during the present century are factors which will greatly assist in obtaining faster transportation economically, and this applies particularly to the rotary types of engines, for the reason that their power per unit of weight and cost is greatly increased as the size of the installation is increased. Further developments of all the new types which are in favour, and experience in their manufacture, may ultimately result in the weight, cost, and fuel consumption being so reduced that the freight of 14 knots speed may be almost as cheap as for 10 knots.

Diagram I. on p. 267 illustrates the influence of costs and weight of machinery and fuel upon freight rate, and should be studied in conjunction with Table II. on p. 266. This diagram and table have been prepared for 400-ft. ships, each specially designed for speeds varying from 10 to 14 knots and propelled by triple-expansion engines supplied with steam from oil-fired cylindrical boilers. The results have been plotted as freight rate on a percentage basis, the 10-knot ship representing 100 per cent.

Table III.—Estimated Freight Rates for Vessels propelled by Engines which would Cost and Weigh only 50 % of Geared Turbines and Consume only ⅓ as much Fuel.

	Speed 10 knots.	Speed 12 knots.	Speed 14 knots.
Block coefficient	0·78	0·755	0·70
Displacement	11,150	10,850	10,130
Draught	24′ 0″	24′ 2″	24′ 4½″
Service horse-power (S.H.P.)	1,665	2,783	4,127
Weight of vessel	2,848	2,870	2,892
Initial cost of vessel	141,500	145,650	150,500
Net tonnage	3,200	3,040	2,700
Crew	40	42	56
Gross deadweight	8,302	7,980	7,238
Oil per voyage	127	169	211
Stores, fresh water, and feed water	140	160	180
Net cargo deadweight	8,035	7,651	6,847
Days on run	20·8 } 30·1	17·3 } 26·15	14·8 } 22·75
Days in port	9·3 }	8·85 }	7·95 }
Number of runs per annum	12·12	13·96	16·05
Total cargo per annum	97,390	106,800	109,900
Total oil per annum	1,539	2,359	3,386
Oil, etc., at £2 per ton	£3,078	£4,718	£6,772
Tonnage dues at 2/- per ton	3,880	4,240	4,340
Wages and provisions	8,160	8,570	11,425
Depreciation, insurance, repairs (1/7 initial cost)	20,214	20,807	21,500
Total outlay	£35,332	£38,335	£44,037
Profit to give 10 % initial cost	14,150	14,565	15,050
Total charges	£49,482	£52,900	£59,087
Rate per ton to give 10 % profit	10/2	9/11	10/9
Management, handling, etc.	3/6	3/6	3/6
Total freight rate	13/8	13/5	14/3
Percentage freight rate with 10 knots as basis	100	98·2	104·3

The lowest line is for hulls only, which it has been assumed could be pulled along by some extraneous means and without involving weight or cost of power. If such a system of transportation were possible, the freight rate would vary roughly as the inverse of the product of the speed and block coefficient, and a 14-knot ship could carry cargo at about 18 per cent. less cost than a 10-knot ship. Upon this curve there have been superimposed others indicating the increase due to cost and weight of machinery and fuel. It will be seen that the weights of machinery and fuel, although important

factors, form the minor part of the costs involved and have the least influence in raising the freight rate. The increase in freight rate at 14 knots is 42 per cent. over that necessary for 10 knots.

It therefore follows that, apart from the benefits given by improved types of machinery over the older types, progress towards economy in fast transportation can best be effected by the reduction in cost of machinery and fuel, coupled with improved forms of hull and better design and arrangement of propellers.

Table III. on p. 268, is an analysis for similar ships to those given in Table II., but with machinery of some type which would cost and weigh only 50 per cent. of geared turbines and consume one-third of the fuel of these engines. The consumptions are therefore analogous to that of our best type of oil engines, but the cost of the fuel has been taken at £2 per ton? These figures appear to be fantastical to-day, except for the fuel consumptions, and they are put forward simply to show what must be aimed at in the future, to obtain fast transportation at economical rates. The weight reduction in particular may be difficult of attainment, but who knows what the results of the present experiments with mercury vapour or with oil-driven turbines may lead to? The only other modification made from Table II. is in respect of the power necessary to drive the 12-knot and 14-knot vessels, and it will be seen that these have been reduced by 2 per cent. and 6 per cent. respectively. At these higher speeds, wave-making and propeller losses play a more important part than at 10 knots, and it is therefore not unreasonable to assume that further experimental work will indicate means by which these reductions may be obtained. It will be seen that the resulting freight rates, under all the foregoing assumptions, are practically constant for speeds between 10 and 14 knots.

Diagram II. on p. 267 shows the relation of freight rates, on to-day's prices, of ships 400 ft. in length, for voyages of 5,000 nautical miles, if fitted with various types of machinery. These types include triple-expansion engines with saturated steam, double-reduction geared turbines with superheat, oil engines of the Diesel type, and, lastly, the "Still" engine, which has been so widely discussed recently and which has a combination of oil and steam cylinders. The fuel consumptions used in arriving at the curve for the "Still" engine have been based upon experimental results which have been corrected for marine conditions.

In each case, oil fuel has been allowed for, and it has been estimated at £3 per ton for the steam engines and at £4 10*s*. per ton for the special oil which is commonly used for heavy oil engines.

Similar percentages have been allowed for depreciation and repairs for each type of engine, although the advocates of the Still engine claim that, owing to the characteristics of the design, and particularly those of the cylinders, these costs should be considerably less than for the earlier types of oil engines. They also claim that, owing to the reactionary forces from the steam cylinders, the stresses on the hull are considerably reduced, which means that the weight of seating and bracing will be much less than required for Diesel engines.

All such factors conduce to further economy, and it might reasonably be stated that ships propelled by Still engines (which, based upon experimental evidence, give the best results at present recorded) would transport cargo at 16 per cent. less cost at 10 knots, and 25 per cent. less at 14 knots, than similar ships with reciprocating engines; and that the cost of transportation at 14 knots, with Still engines, would be only 8 per cent. more than that of a 10-knot ship with reciprocating engines.

Although Diagram II. only refers to the outstanding developments in types of machinery which have shown considerable and definite improvements under full power, the turbo-electric drive also deserves some comments. It appears that such installations, at full power, would give freight rates somewhat higher than those for geared turbines, but, if for any reason it were found desirable to run at reduced speed, the lower power could be obtained by running a reduced number of generators. The working generators would be running at their highest efficiency and the fuel consumption would be less than for geared turbines at reduced power.

While it is not desirable to contemplate the possibility of working at reduced speed for long periods, it must be remembered that there are trades where high speed is not necessary throughout the year. In cases where the cost of fuel is excessive, or in the event of trade depression, it might also be found desirable to reduce speed, and for all such possibilities, electrical transmission gears are well worthy of consideration; it is possible that generators driven by some type of oil-engine would be most suitable for such installations.

Cargo-Handling Appliances.

From the earliest days of overseas shipping, the method of handling large packages of general cargo has been by means of some kind of derricks and winches, or cranes, on the ship, or by cranes, transporters, or manual labour on the quay.

The efficiency of such arrangement has been questioned on many occasions, and, in 1920, when addressing the Institution of Naval Architects, Sir Norman Hill asked, "Are these the last word in efficient cargo-handling appliances?"

Vessels which are employed on the multifarious duties of general traders are frequently required to handle cargo at undeveloped ports and waterways, and in such cases they are entirely dependent upon their own cargo gear.

Shore appliances may, however, be more economical than deck gear for liners, provided they are calling at specially appropriated berths, or at berths at which the shipowner has a reasonable influence in deciding the amount, arrangement, and working of the plant. In this connection it is of interest to review the case mentioned by Sir John Purser Griffiths in 1916, when he related how a German steamship company had endeavoured to influence certain port authorities against installing shore cargo plant. It would appear that this company, with its up-to-date ship equipment,

hoped to embarrass its competitors who might depend largely upon shore plant for a rapid despatch.

Another important factor which has a bearing upon this problem is that the efficient lifetime of liner tonnage is generally less than that of ordinary traders, and the owners of these liners must keep in view the fact that when these ships are obsolete and sold, they will, in all probability, be put on work necessitating the use of their own cargo gear entirely. With such possibilities in view, and considering that the ships would require to be designed so that this gear could be fitted on board, it seems reasonable to assume that the best course, for general cargoes, is to place installations on board all ships and to assist them, when necessary or desirable, by employing shore plant.

Considering that the cost of derricks and winches in a well-equipped ship, after making an ample allowance for depreciation, does not represent more than 5 per cent. of the whole investment and reduces the deadweight cargo capacity by not more than $\frac{3}{4}$ per cent., it seems reasonable to assume that such a system would not be objected to on these accounts, and that the desire is for units which will work more rapidly.

The average 400-ft. vessel of to-day is generally equipped with not more than 14 winches and derricks, and usually there are only 12 or less. In the majority of cases it would be possible for a designer to arrange many more if he were encouraged to do so, but evidently the difficulties incidental to "receiving," "despatch," etc., would, in the average, make such extensions unprofitable.

The difficulties and costs incidental to port despatch are, therefore, not due to the ship or to the handling-gear, but to the storage, transportation, and speed of receiving the consignments, and it is by finding relief from these present difficulties that we may hope to reduce freight rates by from 20 to 25 per cent. on short runs, and by 15 to 20 per cent. on long voyages. A quicker "turn round" would also permit a greater number of ships being accommodated throughout the year, which would help to reduce port charges.

It is thought that if more adequate arrangements could be made for warehousing cargoes (many foreign ports are better equipped than ours in that respect), and if receivers would provide larger storage space for their consignments, some of the past difficulties would be removed.

The matter of transportation from the ship to the receiver should also be the subject of further investigation, and it is possible that the present rail and road facilities could be relieved, in many instances, by transhipment of some of the cargo by extensive lighterage.

At some ports there appears to be an undue amount of work done in weighing cargo; notwithstanding the fact that large quantities of goods are all of the same material, each small package or bag is weighed separately. This practice retards the discharging speed considerably, and, in many cases, it could be lessened by accepting aggregate weights.

Conclusions.

With a view to indicating the developments which will best help progress, the following statement and figures are given:—

(1) A reduction of 10 per cent. in the weight of a ship's hull will reduce freights by 5 per cent.

(2) A reduction in power of 10 per cent., due to reduced resistance, for a given speed, will reduce freights by 4 per cent. at 10 knots, and 8 per cent. at 14 knots.

(3) If an absolute antifouling composition is obtained, freights could be reduced by 5 per cent.

It will be seen that, although such savings are important, they are less than those already indicated for propulsive elements and port despatch.

John Anderson.

Note.—The costs stated in the tables and diagrams, although qualitatively correct for each type, do not represent present-day values, which are much lower than those given.

LINER EMPRESS OF CANADA OF CANADIAN PACIFIC STEAMSHIPS, LTD.

Built and engined by the Fairfield Shipbuilding and Engineering Co., Ltd., Glasgow.

CHAPTER IX.

The Economics of Travel by Sea.

THE subject of ocean passage money is of sufficient public importance to claim some examination. By passage money is meant the sums which men and women pay to be conveyed by ship between one port and another in the cheapest, or third class way; in reasonable middle class comfort; or in relative luxury—whether the journey consist of a trip from Edinburgh to London, from Liverpool to New York, from the Thames to Sydney or Hong Kong, or right around the globe's circumference. Equally, money paid for transportation by land or air is passage money, but it is not proposed here to touch upon those aspects of the question, except in so far as they may relate to passage by sea.

The common impression, dispelled by a moment's thought, is that, of the sum paid by an individual for passage by a ship, the larger part finds its way into the shipowners' treasury as profit. Passage money, like freight money, has to bear its share, not only of the provision especially made for passengers, but of the ship's running expenses and overhead charges.

Shipowners derive the means to maintain and expand their enterprise, to enlarge their fleets, and to open up new lines of sea communication, by building ships, by furnishing them—and the term may be allowed to cover power installation,—by manning them, which includes the provision of wages, housing, and food for those who work in and about the ships; by storing, provisioning and fuelling them; and then by offering for public use the spaces which remain available for the conveyance of passengers and goods, and by transporting such passengers and goods to the agreed destination. Thus built, furnished, manned, stored, and provisioned, with her capacity filled, or mayhap only partly filled, with the goods, passengers, and effects whose safe delivery is the ultimate aim of the adventure, a community of risk and interest is assembled in the individual hull whose complexity may be understood in detail only by those who are informed by daily contact with marine underwriters.

Community of Risk.

This is no place for a dissertation on marine insurance, but it may be pointed out that, in the economic sense, ships can only be adventured against the risks of the sea if those risks are borne, not by an individual, but by owners, passengers, merchants, and shippers each in his due and proper proportion. Moreover, the risks of an individual ship or voyage may not, as a common practice, be borne by

the individual ship or voyage alone; but by a spreading of such individual risk, through the medium of the insurance machine, over a number of ships and a number of voyages, it must be provided that, when the inevitable loss does occur—when the forces of nature or the failure of human judgment claim their recurring tolls in the battle between man and the elements—the loss shall fall, not ruinously upon the individual ship or shipowner, but upon the community having similar interests at risk. Obviously then, one thing to which passage money has to contribute is the insurance of the ship, her furniture and apparel, against the risks of the sea, and this, without labouring the point further, applies equally to administrative costs, upkeep, depreciation, and generally to that class of recurring and unavoidable expenditure known as overhead charges, the first and final purpose of which is to maintain the enterprise in such a state that it may efficiently discharge the functions for which it has been created.

The selling of space in ships, especially in ships belonging to lines whose public reputation demands unfailing regularity of departure and arrival at fixed intervals, differs from the selling of other commodities. Once the date of departure arrives, the ship must sail, full or not full, and for any unsold space, whether in hold or cabins, the market (save for a negligible traffic at intermediate ports) is irrecoverably lost. The dealer in most other things, on the other hand, has the chance that what he does not sell to-day, he may sell to-morrow—perhaps to greater advantage,—but it is obvious that, so far as a ship is concerned, a prolonged succession of programmed voyages in a time of slack traffic and low freights may mean an accumulation of voyage losses which must be met, in the last resort, by recourse to accumulated reserves. Those responsible for the administration of shipping lines operating expensive tonnage have to exercise a prudence, foresight, and responsibility, sometimes even involving the reduction or suspension of dividends, which is but little apprehended by the people who embark week by week and day by day in our great ocean-going liners, or who sometimes charge owners with exploiting the public for the benefit of their treasuries.

Interest on Capital.

Ships are built, lines are originated, and trades developed usually by means of initial capital money subscribed by the public, who thus become shareholders and participants in the prosperity or adversity of the enterprise. It is not surprising if these shareholders expect a return for their money. Should they be content to take a moderate and steady return, their investment is in the form of preferred shares, sometimes with a proviso that unpaid dividends at the prescribed rate shall be carried forward as a cumulative dividend debt, or in debentures which, secured as a charge on the assets of the enterprise and bearing a fixed rate of interest and, usually, of amortisation charges, take precedence of both preferred and ordinary shares in the distribution of profits. But in great commercial enterprises, and shipowning is no exception, some elasticity of dividend liabilities is necessary to

meet the variations of trade; and the ordinary shareholder provides that resilient buffer between enterprise and adversity. He has no guarantee that he will receive a dividend, except the guarantee provided by the probity of those who administer the concern in which his investment lies; but, dispensing with a fixed rate of interest, he takes the surplus available for dividend when all other fixed and inexorable claims have been met. The fixed claims are the moneys due to unsecured creditors and to creditors secured by debenture, mortgage, or banker's guarantee; the inexorable charges are those for upkeep, reserve, depreciation, and renewal, and, in this connection, private shipowners, ship managers (a part of whose remuneration may depend on a successful balance sheet), and ordinary shareholders in a public shipowning corporation may consequently sometimes find themselves without a dividend, but with the knowledge that prudence, and prudence alone, has voluntarily gathered to the corporation's treasury, for the safety of the future, money to the immediate and improvident distribution of which no legal obstacle existed. Shipowners may not gamble in futures. They have to visualise an endless avenue of bad luck, bordered by unkind circumstance, and to make the most of the bright patches as and when they come. Their trade is an international trade, the mobility of their conveyances is limited only by the navigable seas, and is carried on in an arena which is no smaller than the wide world of maritime nations. In this respect their business differs entirely from that of land transport, which being domestic, and to some extent monopolistic, is free from the extensive fluctuations of world trade and from the occasional violence of international competition.

Causes of High Passage Rates.

The explanation may here be noted of the causes which have recently maintained passage rates at levels higher than those which ruled up to three or four years ago. Twenty-five or thirty years ago the passenger-carrying steamship companies had succeeded in evolving a standard of taste and comfort on board ship which had much enhanced the attractions usually associated with a sea voyage. At the same time there had become available in all the large seaports and many of the inland cities, hotels possessing amenities at least equally attractive as those of the best type of ocean passenger liner, and it was at this time that the steamship companies began to take special measures to interest people in sea travel as a source of pleasure in itself. The efforts of the long-distance lines to engage public attention by means of short pleasure cruises in European waters will be familiar to most readers, and there is no doubt that had this movement not been checked by the war, the volume of long-distance sea passenger traffic would, as a consequence, have continued to increase, and passenger fleets to expand. It seems reasonable to suppose that such an enlargement of patronage would have produced a schedule of sea-fares somewhat lower than the already low fares then obtaining. One could, in 1914, travel first class during nine days from Liverpool to New York for £20, a fraction

over £2 a day; from London or Marseilles to Bombay for £53 or £48, respectively, and as all these fares worked out at about 2*d.* per mile, with accommodation thrown in, and meals equal to the best hotel practice ashore, the rates could not be considered high. They were, in fact, at about the same level as fares payable to-day for transport by public omnibuses.

Influences of the War.

The war not only destroyed a large proportion of the best British passenger liners, but those ships which survived had to work double tides and their customary overhauls were perforce scamped or entirely dispensed with. But worst of all, while the rate of obsolescence was doubled, the normal process of renewal by the building of new ships was entirely suspended. When the war ended, another obstacle to the process of renewal presented itself. Shipbuilding costs had at that time risen to such an extravagant level that shipowners fought shy of building, and the net result is that, four years after the armistice, the available ships in the heavy passenger seasons (and nearly all passenger trades are seasonal) have proved insufficient to carry the seasonal traffic in either direction, and this again has caused the period of full traffic to begin earlier and end later. Again, many people who desired to travel during the war, from one kind of necessity or another, were unable to do so and the number of journeys so deferred has run into many thousands. This deferred traffic, added to the desire of people pent up during the war in their own countries to travel purely for pleasure, is contributing to the congestion, with the result that in the seasons when people most desire to travel, the demand for passages is greater than the number of berths available.

The rise in the cost of labour, food, ships, and commodities was necessarily followed by an all-round increase of ocean fares; but while the increase in the cost of commodities was, in some instances, as much as 500 per cent., with an all-round average, at one time, of 358 per cent.,* and while wages of seamen, stewards, and others were trebled, and are still much above the economic level, the charges of the transportation companies for passage, despite the continued excess of demand over supply, have not risen to anything approaching that ratio above the pre-war level, and the tendency is already downwards. In thus moderating the increase of passage rates, British shipowners have followed their traditional practice of taking the long view, and should thus have escaped any feeling of public resentment on the score of profiteering.

It cannot be denied that the revival of the wholesome competition inseparable from international trade, has contributed to the steadying of passage rates. In this connection one may reflect that the escape of British shipping from the bogey of nationalisation should be a source of congratulation not only to shipowners, who are under no delusions on the subject, but especially to the travelling public. For nationalisation and lack of competition would soon have reduced our maritime services to a hopelessly dead level of inefficiency, and would,

* *Economist* tables.

at the same time, have brought the operating costs to a prohibitive figure which must, to some extent, have been reflected in passage rates by British steamers, the factor of international competition notwithstanding.

The tendency of the passenger lines, arising equally from policy and from competition, was, and is, rather to increase the facilities and amenities enjoyed by passengers than to raise passage rates. But the movement from the rough simplicity of the 'sixties and 'seventies, through the plain comfort and solidity of fare of the 'eighties and 'nineties, towards the luxury and splendour in the ships of the twentieth century had reached, at the outbreak of war, in the Atlantic trade, where international competition was keenest—particularly competition between British shipowners and the State-backed German lines—a standard which is likely to survive as long as Europe continues year by year to attract, in large numbers, the richer citizens of the United States of America. This movement towards greater luxury afloat has been mildly reflected in the Eastern and South American trades, and while, generally speaking, the basic first-class fares, plus war-percentage, have remained stationary, fares at the upper end of the scale have continued to express higher values as special cabins and luxurious suites of rooms have been added to the equipment of passenger steamers. Such ships are frequently called floating hotels, but, unlike hotels ashore, they must be entirely replaced at intervals of fifteen or twenty years.

Luxury on Board Ship.

But the poorer first-class passenger can still travel at moderate rates, and with the general improvement in the public rooms of the large liners, which has occurred as part of this movement towards greater luxury, he gets more for his money. This tendency towards luxury in ships is worth a moment's examination. It is not, in the opinion of the writer, to be deplored. If it reflects the passing of greater wealth into the hands of a greater number of individuals, it also indicates the willingness of these individuals to decentralise their wealth; and the provision of a generally higher standard of architecture, decoration, furniture, and accommodation in ships must involve the employment of a vastly greater number of skilled craftsmen in fitting-out yards.

This tendency towards elaboration is reflected in the ships which cater especially for passengers of humbler means and, aided by the universal demand for improved standards, has produced in the Australian and Atlantic trades a class of ships which in space, ventilation, and fittings are not generally inferior to the accommodation provided thirty or forty years ago in the first-saloon accommodation of the liners of that day.

The Carriage of Migrants.

No change is so eminently remarkable as has occurred during the past sixty years in the accommodation provided for emigrants—or

migrants as they are now more conveniently called. It seems to-day a far cry to the time when in space, ventilation, and sanitation many emigrant ships, especially in rough weather, reproduced conditions approaching those of the Black Hole. Medical comfort there was none; service little or none. Passengers of sufficiently robust constitutions, battened down during a period of tempest, cooked and ate their food in the steerage common to all and presently turned into hammocks in the same space. Those who were sick received little or no attention, and it was a normal happening that, on such a voyage, deaths among passengers from disease and privation, heightened by physical discomfort, occurred, sometimes in numbers which would be a shock to the public mind to-day. There were exemplary exceptions, notably in the ships of Green, Money Wigram, and others, and the voluntary maintenance of the high standard of management set by those firms tended to an all-round improvement.

This condition of things has passed away for ever and, in these days, the term "emigrant ship" has become meaningless, for third-class accommodation in first-class liners, and equally in those liners which cater for "one-class" passengers only, invariably transcends the standard laid down by Government regulations. Indeed, it is safe to say that since the public conscience was awakened and regulations of this kind instituted, some fifty or sixty years ago, for the protection of "emigrants," shipowners' efforts at betterment invariably left the Government standard behind as a hopeless laggard, and at no time to a more remarkable extent than to-day. But the luxuries of to-day become the necessities of to-morrow, and an examination of the successive regulations would show a belated reflection of the voluntary and progressive policy of British shipowners. In that, they but reproduce the self-governing characteristics of their race. To-day, the third-class passenger has his range of bathrooms, his dining, smoking, and music saloons, and the open dormitory deck has been replaced by cabins for two, three, or more occupants, in which at least a certain measure of privacy is attainable. The extra cost of all this improvement has been met partly by an increase in the rates of passage-money, but to a much greater extent by improved administration at head-quarters.

"One-Class" Ships.

There is only one direct way from the United Kingdom to Canada and the United States of America—the Atlantic way; but it is served by excellent lines operating excellent ships of varying degree, and among those ships are not a few of the "one-class" type. The lordly way to the East and Australia is via Suez. But the days have passed away when, for the returning emigrant or settler, "home via Suez" was the sure sign of success, realised ambition, and, incidentally, the ability to pay for the best class of steamship travel. Nowadays, a "one-class" ship will convey on a single voyage more than 1,000 passengers to the Canadian Dominion, to Australia via the Cape of Good Hope, or via Panama to New Zealand, but in the best of her cabins on the return voyage will be found men and women who have

"made good" in the new lands. Thus one general result of the improvement in "unclassed" ocean travel is a more frequent intercourse, in the settlers' probationary years, with the old country, which cannot be without influence on the racial cohesion of the British, at home and overseas. Transport is, indeed, a chief aid to progressive civilisation, and, in this respect, the services of the British mercantile marine cannot be measured in terms of passage money.

Problems of the "Table."

But to return to the immediate subject of this article, it may be postulated that the services to be rendered to passengers in exchange for their payments are a matter of constant concern to those responsible for the administration of the great and smaller passenger lines. Only those who have seen, at both ends of the road, the executive at work day by day in the maze of affairs involved in the preparation for voyage after voyage of the year's programmed series, can appraise the vast amount of forethought and effort which go to the ultimate furnishing of the cabin, the larder, the wine cellar, and the table. The last is not rendered less complicated by the fact that all the daily work of providing for the wants of passengers is done afloat from the resources within the ship, and without that daily access to markets which makes the work of the hotel keeper and restaurateur ashore a comparatively simple matter of routine. And when all the best efforts of those ashore have been expended, the ship's company take up the running. The building up and maintenance of an efficient staff afloat is not the least among the cares of the shipowner.

First and foremost comes the commander, who, among a multitude of responsibilities attaching to his position, is the social head of the ship, and is so regarded by his passengers. Consciousness of this position may vary with the individual commander; but his passengers never forget it. Travellers, old and young, will recall with pleasure the exchange of a few cheery words, or a chat during a brisk turn on deck with the skipper; to dine at the commander's table is usually a coveted privilege. But behind these superficial happenings, the commander has weightier matters to consider, day in day out, throughout the voyage; half an hour spent in his cabin would reveal the coming and going, usually at a fixed time of day, of the chiefs of the deck, engine, and purser's departments, and sometimes the surgeon of the ship, for report, consultation, and instruction.

The Purser's Department.

While the welfare of the passenger is dependent upon general efficiency throughout the ship, it is upon the purser's department that he normally depends for his comfort and for the satisfaction of his daily wants during the voyage. The post of purser in a large passenger steamship is rightly considered a very attractive one. His training and qualifications are of an exceptional nature, and his duties are not simple. They demand constant

supervision of his staff, great exactitude, care, and economy in the ordering, storing, and expenditure of material; and, in his relations with passengers, untiring patience and unfailing tact. Generally speaking, the same qualities which assure success in the management of a great modern hotel go to the making of a first-class purser on board a liner. The duties of both are much akin, but with this difference, that while the hotel manager can, as has been said, renew his supplies from the same markets on fixed contracts every working day of the year, the purser has to supply the needs of his passengers from stores of all kinds laid in at the beginning of the voyage, mostly preserved by refrigeration, and supplemented by purchases in widely differing markets at successive ports of call, some of them as much as fourteen days apart.

The aspirant for this employment usually begins his training at an early age in the offices of a steamship company, where he acquires a knowledge of pursers' accounts and of the booking and berthing of passengers and the purchase of ships' stores. Later he will be sent to sea in the capacity of purser's clerk or assistant purser, during which phase in his career he will become familiar with the business of supervising purser's stores, compiling bills of fare, and generally giving an eye to the discharge by the staff of their various duties. Here, if he be made of the right material, he will acquire the habit of command, learn to handle men without friction, and become familiar with the recurring idiosyncrasies of the travelling public. From this basis he will build up the faculty of disposing happily of the difficulties which inevitably arise on a long voyage, a considerable portion of which may be passed under trying and, for passengers, quite unaccustomed climatic conditions. And during this period of his training he must possess himself of that supreme housekeeping genius which is the hall-mark of the finished purser, who knows everything, sees everything, and directs everything in his particular sphere without appearing to do so. It may be suspected that from this hidden influence in the successful purser springs the erroneous impression that his is a life which embodies a maximum of enjoyment with a minimum of work and responsibility.

The services necessary to be rendered by shipowners in respect of their passenger traffic, beginning at home and continued at sea, do not end there. Shore establishments, with expensive staffs of managers, superintendents, and assistants, have to be maintained at the centres of traffic on all their routes; and if the regularity of a service is to be preserved, a line must possess ships over and above the normal requirements of its trade with which to fill gaps which may be caused—and such happenings are fortunately rare—by marine casualty or breakdown of machinery.

Much more could be written on this topic, but enough has perhaps been said to make it abundantly clear that, in order to earn and keep the patronage of the travelling public, untiring effort and unremitting attention to detail are needed on the part of the shipowner and all who are concerned to aid him in his enterprise.

F. A. Hook.

CUNARD LINER TYRRHENIA.

Built and engined by Messrs. William Beardmore & Co., Ltd., Dalmuir.

CHAPTER X.

Pilotage and Pilots.

Pilotage is a calling about which little is really known outside the circle of those directly concerned. This, however, is not to be wondered at. Considering how largely dependent this realm of Britain is upon her shipping, how closely the prosperity of the kingdom is linked with the prosperity of her mercantile marine, it is surprising how meagre was the knowledge possessed by the people, until quite recent years, of her ships and seamen, with the exception of those living round the coast-line.

Probably the last war did more than anything else in the history of the nation to bring home to the people the value of and the need for many and good ships, and a courageous, hardy race of seamen to man them. In time of war the very life of the community depends upon the possession of them, and an efficient, patriotic pilotage service forms part of that possession. A glance at its origin and afterwards at its use and growth therefore may not be void of interest, though considerations of space render it necessary to confine attention to this country only.

History of Pilotage.

It may be as well to state at once that a pilot is an officer on board ship having control of the route. In olden times he was carried the whole voyage, or on a passage between ports: to-day he is taken on board at certain places from cutters, or shore stations, to conduct the ship through intricate, dangerous, or congested waters into or out of port.

As far back as 600 B.C. we find pilots definitely mentioned in connection with the trading from and to the ancient port of Tyre; not only mentioned, but counted amongst the wise men of that city. There is very little doubt that many years before this, Dan in his ships, with the aid of skilful pilots, had found his way from place to place down the waters of the Mediterranean, and passing from headland to headland, harbour to harbour, the pilots retaining in their minds' eyes the appearance of prominent points and the land generally under all weather conditions, had, greatly daring, passed through the Straits of Gibraltar, up the coast of Spain and across the Bay of Biscay to these islands.

This gift of being able to remember, to mentally photograph at first sight and retain for future use, the appearance of a coast or harbour, is one that all good pilots should possess and cultivate, so that, having obtained a glimpse of an object between rain or snow

squalls, or a temporary lifting of fog, he may at once recognise it, allowing for all distortions caused by weather conditions, and proceed on his voyage with renewed confidence.

As far as one can gather by reading, the oversea pilot was in great demand and occupied a prominent position in the maritime community in the early days of voyaging and discovery. He was sometimes called the Lodesman or Lodeman, and in the Black Book of the Admiralty, edited by Sir Travers Twiss, Q.C., there are two extracts from the laws of Olèron relating to him under this name. The first runs thus: "It is established for a custom of the sea that if a ship is lost by defaulte of the Lodeman, the Maryners may, if they please, bring the Lodeman to the windlass, or any other place and cut off his head, without the Maryners being bound to answer before any Judge, because the Lodeman has committed high treason against his undertakynge of the pilotage." The possibility of this method of payment would certainly act as a deterrent, and make most men pause before accepting the post of pilot unless they felt quite competent to perform its duties.

The second extract is interesting, and has passed down in practice to the present day; happily the first has not: "The Lodeman has well done his dutie when he has brought the shyp in safety to a berth, for so far he is bounde to bring her: and from this time the trust is on the Master and Maryners." These laws of Olèron were introduced into this country in the twelfth century, and perhaps represent the first attempt to formulate an international code of maritime law, although, in the first place, they seem to have been drawn up in the interest of the wine-shipping in France.

Cabot and Drake and Pilotage.

As the science of navigation and charts became perfected, the need for, and the desire to obtain, the services of the over-sea pilot decreased, but to illustrate how much they were esteemed, it may be mentioned that, in 1549, King Edward VI. made Sebastian Cabot Grand Pilot of England in the evening of his days, and granted him an annuity of £166 in recognition of his services and for his advice. The document read thus: "To all whom these presents may come, we have given and granted to Sebastian Cabot a certain annuitie from out of our Treasurie of £166 13*s.* 4*d.*

Francis Drake, that daring, resourceful, and capable British seaman, navigator, and discoverer, was never averse from obtaining the services of a pilot, forcibly or otherwise, to assist him in the particular voyaging he was, for the time being, engaged upon. Then, when his knowledge was of no further use, the pilot, if a foreigner, was graciously landed somewhere whether it was quite convenient to him to be landed at that particular place or not. These were adventurous days, and those who went to sea took risks other than those of the elements. Moreover, when in command one had to be a law unto oneself. Drake was a wise man, and we may assume that the safety of his own men and ships prompted him to choose the places he did for the purpose of getting rid of the

gentlemen whose services he had impressed in far distant parts of the world.

Richard Hakluyt records a very interesting Spanish regulation relating to pilots, dated 1596, showing what an important position these men filled in the ships of those days, as follows: "Your Pilot must be examined by, and allowed by such as be appointed for the examination of Pilots: that he be a sufficient man to take the charge in hand and that which belongeth thereto to governe, and lead the ship by his onely command to such ports and places as are convenient for the voyage in hand."

One is tempted to linger over the history and admire the pluck, intelligence, and resourcefulness of these oversea men, who in the course of time fell largely into disuse, or, to put it more correctly, whose duties became merged into those of the master mariner, although pilots even now are frequently employed on large vessels when going round dangerous coasts. It is necessary to pass on, however, and glance at pilotage as it is understood to-day.

As ships increased in number and size, and went on longer voyages, the need began to be felt for a class of expert men to conduct them through dangerous home waters, and to bring them safely into and out of our ports, thus avoiding loss of life and valuable cargoes; also to guard against narrow channels in estuaries and approaches to harbours becoming obstructed, or blocked, by sunken wrecks. Thus the local pilot came into being in a recognised form. To-day he is a qualified seaman, native-born, having great local knowledge; is examined and licensed by a pilotage authority to conduct ships through difficult, dangerous, and congested waters at a scheduled rate of pay; his fitness, in every respect, is inquired into before the licence is granted; he is governed by Act of Parliament and regulated by rules and bye-laws, the licence being renewed from year to year.

Origin and History of Trinity House.

To organise services and supervise these men, guilds and associations were formed, chief amongst which were the Trinity Houses of London, Leith, Hull, and Newcastle. That of London was naturally the most important, and is known to-day as the Honourable Corporation of Trinity House of Deptford Strond. It most probably had its origin in a guild, or association of mariners of London, or those trading to that city. It was founded in 1512 by Sir Thomas Spert, Comptroller of King Henry the Eighth's Navy, and commander of his big ship the Henry Grace de Dieu, in which the King sailed to Calais when going to the Field of the Cloth of Gold. Sir Thomas became the first master of Trinity House when it was incorporated in 1515 by Royal Charter for the regulation of seamen, the convenience of ships and mariners on our coasts, and to license and appoint pilots in and out of the Thames. When granting this Charter the King also confirmed to the guild its ancient rights and privileges, which rather points to the fact that it had its existence as a powerful body long before his day.

It had many duties thrust upon it, some of which from time to time have necessarily been transferred to other departments of State, but that of examining, licensing, and regulating pilots was confirmed and enlarged by James II. in 1685; and by virtue of certain Acts of Parliament, the last of which is the Pilotage Act of 1913, these powers are still retained by the corporation and exercised by the Master, Wardens, and Assistants, who are seamen of repute and experience.

In 1808, during the reign of George III., an Act was also passed which gave the London Trinity House powers to regulate pilotage in all the outports for which no Act or charter existed. This brought some thirty-five outport districts under its jurisdiction, ranging from Yarmouth on the east coast, right along the south and west coasts to Maryport, with the exception of the large ports in the Bristol Channel and Liverpool. Perhaps no greater acknowledgment of the efficiency of its methods could have been paid to the corporation than this vast extension of its scope and jurisdiction.

The pilots at these outports are under the supervision of sub-commissioners who act under, and are responsible to London, and in most cases are to be found within the precincts of the local Customs House.

The Trinity House of Dover, Deal, and Thanet had as its head the Lord Warden of the Cinque Ports, who, until 1853, had jurisdiction over the Cinque Port pilots; in that year, amongst other changes, the pilots were passed over to the supervision of the London Trinity House, but they still retain their former title, although forming part of what is known as the London Pilotage Service.

The London Pilotage Service.

The Thames and Medway have a very large and efficient service, totalling over 300 men, to supply the constant stream of shipping that comes and goes over those waters from and to all parts of the world. Steam cutters cruise off Dungeness to supply the ships coming in from the southward and westward, and off Harwich for those from the north and eastward. These vessels, which are especially built for the service, are very costly, and well equipped with all the necessary appliances for constant boat-work and accommodation for the men. They have now entirely taken the place of sailing craft, as it was found that steam was required to cope with steam. Summer and winter, night and day, they cruise on their appointed stations, unless the weather is so bad that it is unsafe to lower their boats, and watch for the incoming ships,—exhibiting a large red and white flag by day and red and white lights, vertical, by night. The men shipped from them bring the vessels up to Gravesend, where they are relieved by river pilots, who continue the voyage to the dock or wharf for which the vessel is destined.

The station for outward-bound vessels is at Gravesend, both for Channel and river men, whose headquarters are on the Royal Terrace Pier, where steam and motor cutters are always either laying at the pontoon in readiness, or off in the river attending to ships. To any one interested in shipping, Gravesend Reach is nearly always worthy

of attention, presenting a moving panorama of liners, tramp-steamers, colliers, schooners, barges, tugs, customs-house and pilot launches, and railway ferries, all trying to get through the congested waters, and at the same time striving to keep clear of each other. After a prolonged fog, especially if the weather has been clear to seaward, so congested is this Reach that to navigate without collision calls for all the skill and presence of mind that pilots or shipmasters possess. The London pilotage district is a long and trying one in fog and mist, and much credit is due to the men who navigate it and to the organisation of Trinity House, that delay to shipping is reduced to a minimum.

The Humber Pilots.

Passing out of the Thames Estuary, which to the uninitiated is a veritable maze of sands and channels, into the grey North Sea, past the Essex, Suffolk, Norfolk and low-lying Lincoln coasts with all their outlying shoals, which form a first line of defence in time of war, one comes to Spurn Point on the Yorkshire coast at the mouth of the Humber, where the pilots for Grimsby, Hull, and Goole keep watch. On this river, generally speaking, half of the men work inward and half attend to the ships outward, the duty being changed from time to time. Very fine steam cutters have taken the place of sail here also, largely owing to the enterprise of the local pilots.

These men are now under the Humber Conservancy Board, but in former years they were under the Hull Trinity House, which claims for itself an origin even a little more ancient than that of London. It received its charter in the same reign, and claims to have been founded in 1369. It is interesting to note that Sir A. Rollit, in his researches, found that Henry VIII., when visiting Hull, upon seeing a strange vessel enter the port in charge of its master decreed that, in future, every vessel sailing into the Humber should take a local pilot on board.

Whether this was a retaliatory measure or not one cannot tell, but it is known that Wisby, once a very flourishing Swedish town in the Island of Gothland, had previously made a regulation that all ships when approaching the coast should be compelled to take a pilot. Yet in the forty years before the last war, when Germany was preparing in every way for her great bid for world dominion, Hull, perhaps more than any other port in the United Kingdom except London, had to endure the sight of the alien master piloting his own vessel into and out of the Humber by virtue of a certificate granted to him by a British authority; and a large percentage of these aliens were Germans.

The Tyne and Firth of Forth Pilots.

Coming to the Tyne and reading its history, one is struck by the bitterness of the strife in the old days between the Corporation of Newcastle and the Bishops of Durham as to who should have control of the river, its shipping and pilotage. Seemingly, the Bishops tried to reserve for Shields the monopoly of the whole business, and for

very many years with more or less success. But the inevitable happened at the dissolution of the monasteries in the reign of Henry VIII.: the Abbots and Bishops were brushed on one side, and the King granted a charter to Newcastle Trinity House in 1536, which gave not only the control of shipping, but the monopoly of pilotage to the Trinity Brethren, who had to be freemen of Newcastle.

This state of affairs existed until, in 1697, James II. caused the restriction to be withdrawn and the pilots began to drift down again to Shields at the river-mouth, which was undoubtedly the best place for them. The Trinity House continued to license them until 1865–66, when the Tyne Pilotage Act became law and a Pilotage Board was elected under it, which gave to the pilots direct representation, this being the first port in the kingdom to confer that privilege.

Shields claims the honour of inventing the lifeboat, and the pilots, brave, sturdy seamen all, were ever foremost in assisting to man them. Many lost their lives in their efforts to rescue the crews of ships wrecked off this dangerous stretch of coast, and in the Pilot's Church at the Lawe, tablets have been placed in memory of some of them.

One dare not leave the east coast without going to the Firth of Forth and telling of Leith; how it was at one time the chief port in Scotland; was mentioned in a twelfth-century document; and how its Trinity House was founded in 1380, but did not receive its charter until 1797. This authority licenses the pilots for the Firth of Forth and also issues licences for the coast of Scotland, but not into any port or harbour that has a Pilotage Authority of its own. In the past there have been mild conflicts between the Trinity House of Leith and those of Hull and London with regard to the overlapping of coasting licences; this friction, however, has now been very largely smoothed away.

The Southampton Pilotage Service.

Leaving the east coast and going down the English Channel on our way to the westward, Southampton and its service calls for remark. Forming one of the Trinity House outposts, it lies tucked away at the back of the Isle of Wight surrounded by beautiful country, and having one of the prettiest approaches from the sea, up the Solent and Southampton Water, of any port in England.

Not many years ago it was served by a few men cruising in their little cutters off the Needles, the Nab, and Calshot, and very little used except by the cross-Channel services and the Union-Castle Line. To-day it is an important port of call, having a big staff of men, holding within itself and its situation vast possibilities, which, if developed as they bid fair to be, may rival Liverpool and rouse up London.

Southampton has accommodated the largest liners and has much room for extension. Thanks to the London and South Western Railway Company, it had its railroads leading everywhere from all over its docks and ocean quay some years ago, and had already attracted some of the western ocean liners. Then came the war,

and the military authorities took over the port. Who shall count the number of men that passed through Southampton or the number of ships piloted into and out of the port between 1914 and 1919? It became one of the busiest ports in the kingdom and the exodus from its docks a never-ending stream. Night after night when coming from the eastward, London pilots became even more vigilant and watchful, if that were possible, as they approached that part of the Channel between Selsea Bill and St. Catherine's, for in those times vessels steamed without lights, and a warning red or green side-light might be suddenly blinked by an accompanying destroyer or light cruiser to indicate in which direction a convoy was steering. Those were anxious times for pilots, shipmasters, and officers, and their record is one of work well done. During the years of the submarine menace, the Needles entrance was closed, only the passage to the eastward, by Sandown and St. Helen's, being used. Now the port is in full swing again, and is rapidly becoming a favourite one for passenger ships from and to all parts of the world to call at.

The Bristol Channel Pilots.

Coming west to Bristol, one finds that the Corporation of that city is the pilotage authority. Until quite recent years it was no uncommon sight to find the little pilot-cutters of this ancient port cruising at the western end of the English Channel looking for big vessels; but with the passing of the sailing ship, it has been recognised that the interests of all concerned are better served by keeping the craft nearer the port for which they ply; this also obtains with Cardiff and the other important places at the head of the Bristol Channel. Doubtless in years gone by, masters of sailing ships bound to Bristol were glad to find these little craft far out and to take their pilot on board before getting up into the head-waters of the Channel, where the tides run swift and strong. Cardiff, Barry, Newport, and Gloucester have each their Pilotage Board, whilst at Swansea the Harbour Trustees supervise the pilots.

Pilots of the Port of Liverpool.

Passing right round the Welsh coast we reach the port of Liverpool, whence come and go the leviathans of the western ocean trade, and the fleets from the east and west coasts of South America, conducted to and from the landing stage and docks by the 170 pilots of the port. The series of docks, side by side along the river-bank at Liverpool, has perhaps no equal in the world for accessibility and convenience.

The pilots of this great port are governed by the Mersey Docks and Harbour Board, a very enterprising community of business men. The cutters cruise off Pt. Lynas and at the Bar Lightship both for inward and outward work.

When one considers that at the end of the eighteenth century Liverpool's shipping was a modest 5000 vessels amounting to about half a million tons, and that a century later 26,000 vessels with a

tonnage of fourteen millions entered and cleared in a year, one cannot but admire the zeal and enterprise that has built up such a gigantic trade as now frequents the port and of which her pilots and citizens are justly proud.

The natural facilities of the place undoubtedly lend themselves to the making of the port, but no small credit is due to the Board that has developed it, and the men of the pilot service, who, threading their way through the narrow and frequently changing channels between outlying dangerous sands, have given of their best to make this great emporium of the west coast popular with shipping.

The Clyde Pilots.

On the west coast of Scotland, most of the small harbours have pilotage authorities which look after the needs of their respective ports, and, in many cases, the authorities are the harbour trustees also.

Pilotage on the Clyde is now under the control of the Clyde Pilot Board, and the district extends from Glasgow down to the picturesque entrance of the Firth at the little Cumbrae. The transformation of the river from the great city down to Dumbarton from a comparatively small stream to a busy waterway, the banks of which throb and resound with the building of ships of all sizes, is one of the triumphs of the engineer over nature, and one of the sights of Scotland. When viewing some of the great vessels under construction, one almost wonders how they are going to be transferred from the stocks to the river and got out to sea without disaster; but amongst other things, the skill of the pilots in handling them has kept pace with the growth of the industry, and accidents very seldom happen. The retort of the angry British pilot to the American shipmaster, who had been indulging in comparisons between the rivers of America and some of those in Britain, and making disparaging remarks about the latter, must surely have been voiced on the Clyde or Tyne: "God Almighty *gave* you your rivers ready made; we had to make ours," said the pilot.

Requirements of a Pilotage Service.

An efficient pilotage service has been called, with some truth, the greatest life-saving institution round the coast. Looked upon as such it is worth preserving, maintaining, and carefully guarding to prevent deterioration. It should be supervised by practical men, who should not be harassed by multitudinous and contradictory laws. In the past there has probably been too much legislation in connection with pilotage; an accumulation of Acts to repeal and Acts to re-enact, until at length the law governing it became such a maze that one had difficulty in finding the right road out. To do away with this confusion was the main object of the Act of 1913.

To ensure efficiency where a service is a real need—and by efficiency is meant a constant supply of expert, responsible men, taking an intelligent interest in their business—the compulsory

system, with reasonable exemptions clearly laid down, is probably the best, and therefore the most satisfactory. At ports of any importance, it cannot be expected that men and a costly outfit of the necessary craft can be kept always ready for use if they are only to be taken on in thick, or bad weather; though this is very often the case where pilotage is non-compulsory.

To be at his very best a pilot needs to be constantly employed at piloting, night and day, summer and winter; of course with sufficient time for rest. When he takes up his licence he is practically bound to one port or district for his working life. He cannot move on to some other place, as men in any other business can and do, and for this reason the number of men licensed at a place has to be very carefully watched, so that it does not become in excess of the actual normal requirements; some of the smaller ports present considerable difficulty in this respect.

A good service is a great time-saving, and therefore money-saving, institution, for delays of six or twelve hours to some of the ships of to-day mean much money, and under a good system of pilotage such delays are avoided. In Pepys' diary he records how, in 1665, he wrote twice to the Trinity House at Deptford complaining that the vessels could not sail from Harwich to the Continent because no pilots were available. Judging by the tone of the entries, he was much annoyed and considered he had a grievance; possibly he had, but one does not read of any special efforts being made to remedy it. One can quite easily imagine the telegrams and telephone messages that would be sent if such a thing happened to-day.

The position of a pilot is not always an enviable one. Generally speaking, if he is a capable man, he is welcomed on board, and in the case of long or difficult districts, his presence is looked forward to, and every reliance placed upon him when he becomes known to the executive officers. There are times, however, when this is not the case, and his every order is watched and sometimes questioned. He has need of a strong, self-reliant character; and must be mentally well-balanced, alert and quick to take in all his surroundings, able to make up his mind with unerring judgment, prepared to take risks when necessary, since risk is inseparable from the seafarer's calling, quietly courageous, and undemonstrative. To be transferred in a few moments from a cutter to the bridge of a large vessel and take charge in driving rain or mist, or in a pitch black night, surrounded perhaps with other ships, calls for all these qualities.

The United Kingdom Pilots' Association.

Mention must now be made of an association formed by the pilots of the kingdom. The development of steam for marine propulsion led to severe competition, and lean years came to shipping in the seventies and eighties of last century. Efforts to economise, not always well-directed, were made by owners, and as a result of these efforts came a clashing of interests, in which the pilots found themselves involved. Inter-communication between the ports and the men had become easier and more frequent, and, in 1884, the

United Kingdom Pilots' Association was formed. Its first president and champion was a very fine seaman, Commander George Cawley, R.N.R., who gave many years of his life to it and the cause of the pilots. It took for its motto "Defence not Defiance," and was brought into being mainly to offer strong united opposition to a Bill that had been framed to abolish compulsory pilotage throughout the kingdom; to resist the growth of alien pilotage certificates; and to promote the contentment, efficiency, and stability of the whole pilotage service.

Its demands were always moderate, patriotic, and reasonable, consequently it made many staunch friends, both in and out of Parliament. Constitutional methods of redressing wrongs only were permitted, or practised: the strike, or the threat to strike, was never included in its scheme of working. Its efforts on behalf of the pilots have, so far, been to the good, but the unrest of the times, maybe, has left its imprint here also. Of late years there have not been wanting in its discussions signs indicating that a few of its members have allowed the great fact, always kept right in the forefront by its first president, that "Pilots were made for ships and not ships for pilots," to become more or less obscured. Later this fact will again become clear when the miasma of unrest, suspicion, and jealousy that has darkened our vision since the war has blown away. In the meantime nothing has happened to tarnish the good name and fame that was long and earnestly striven for. After considerable debate amongst its executive members, the Association has lately affiliated with the Seafarers' Union.

Pilotage Charges and Alien Pilots.

There has been controversy of late at some ports over pilotage rates and charges, due, in some cases, to the enhanced cost of living and upkeep of craft, and in others to the utterly wrong impression formed by many during and since the war, that a ship in commission is an inexhaustible mine of wealth to draw from. As a matter of fact many ships to-day are being run at a loss, and many more with a very narrow margin of profit, merely to avoid the depreciation which results from laying them up.

It is a perilous thing for any port to allow its charges to get too high; sooner or later it gets a bad name, and whenever possible it is shunned by shipowners and charterers, so that lean times inevitably follow. There are some large ports which are naturally and geographically distributing centres, and a certain number of ships are bound to use them; but even in such cases there are generally other ports close at hand that are eager and ready to enter into competition, and unless charges are kept at a reasonable figure, trade will surely trend in the direction of the cheaper port, provided, of course, that it is a safe one. It is advisable to remember this when pilotage rates are being revised and fixed. Obviously it is better to have four ships coming to a port paying a reasonable rate willingly, than one ship which is compelled to pay grudgingly an excessively high one.

The alien pilot's certificate has always been a cause of discontent amongst the pilots of this country. This certificate is one granted, upon payment of a fee, to the master or mate of a foreign ship by a British pilotage authority, sometimes under pressure from the Board of Trade, and it permits the holder to pilot the foreign vessel upon which he is serving through a British pilotage district without employing a British pilot.

Before the war, quite a number of them had been issued, and many pages might be written telling of the efforts made to bring about their abolition. From time to time deputations from the United Kingdom Pilots' Association waited upon the President of the Board of Trade, asking that the issue of these certificates should cease, and men in high and responsible positions had expressed adverse opinions on the practice with very little result; it remained for Mr. Lloyd George, when President of the Board of Trade in 1906, to grasp the situation fully.

A Bill had been drafted for the abolition of the certificates, and he, after receiving representations on the matter, gave instructions to the various pilotage authorities that no more should be issued pending the passage of the Bill.

When the Bill passed it was found that certificates already in existence were to be allowed to die out with their holders. Every effort, short of taking the lives of their holders, was made to hasten their end, without success, and so they continued to exist, diminishing slowly until the war broke out in 1914. Then the Admiralty cancelled them with one stroke of the pen, as being, what they always had been, dangers to the realm.

They are no longer issued, except to a few French masters trading to Grimsby and Newhaven, and this is done under a special clause in the Aliens Restriction Act. Thus ended a long drawn out controversy between the United Kingdom Pilots' Association and the Board of Trade.

There has always been a diversity of opinion as to the right and the wrong of granting these certificates. The British pilot, however, never held any other view than that the practice was wrong, dangerous, and unpatriotic, and he persistently and consistently voiced this view whenever occasion offered. To permit and encourage a foreigner to learn the intricacies of the channels or fairways in our estuaries and harbour approaches, the lie of its sands and outlying dangers, which in the case of attempted invasion are a first line of defence, has always been considered by pilots to be suicidal. Considerable use was made of the argument that, given good charts, an alien could, if he wished, navigate into any of our ports. This, however, is not so in the case of long or difficult approaches. On the other hand, practice does make perfect, and undoubtedly there is more learnt from actually piloting a vessel once or twice through a long district than there is from months of study of a chart.

From the point of view of national safety, to legalise any procedure which will jeopardise the realm or benefit the foreigner at the expense of the native-born subject, is to court disaster in the long run.

Pilotage in War-Time.

This glance at pilotage would scarcely be complete without touching upon the use of the pilot in time of war. The important part the mercantile marine played during those terrible years of war has been realised and recognised. That of the pilots is not so well known, although the Admiralty, in a circular letter to the London Trinity House, paid their tribute of praise to the pilots licensed by them. The following is an excerpt from the letter:—

"My Lords Commissioners of the Admiralty are desirous of conveying to the Trinity Pilots and the pilots holding the Admiralty special deep-sea certificate their appreciation of the valuable services that they have rendered during the war.

"The services performed by the pilots have been very meritorious and have been carried out with conspicuous success. Their work has been performed under conditions of considerable danger. In 129 cases pilots have been mined, or torpedoed whilst in charge of vessels; some of them two or three times. Thirteen pilots have lost their lives while in charge of vessels which were either mined or torpedoed, whilst eight pilots and six members of the crew of the Trinity House pilot cutter Vigilant were killed when that vessel was mined whilst on duty at the Sunk Pilot Station; two pilots, captured by the enemy whilst in charge of vessels, were interned in Germany."

There is no doubt as to the value of the services these men were able to render—entrusted as they were with secret instructions as to routes, and as to procedure in the event of being overpowered and captured by the enemy. Week after week, and year after year, they zig-zagged their way north, south, east, and west, up and down, over and across the North Sea and English Channel; sometimes steaming by night, sometimes by day, conducting the fleets of vessels that came and went upon the country's business. Looking back one scarcely realises the amount of work they did, and this work was never finished, for as soon as one vessel had left another was waiting to be supplied and conducted. Often at the outer stations a man was taken by the cutter from one ship and put straight on board another.

These men knowing the danger, quietly and bravely served their country; they never expected, and seldom received, any thanks. They navigated over some millions of miles of water in the worst of the danger zones, and the value of the property safely conducted by them is beyond calculation. The value of the mined and torpedoed ships which, by reason of their presence on board and their especial knowledge, they were largely instrumental in salving, was also immense.

To give one illustration, not an uncommon one in those days, of the dangers met with on a passage from the Thames to Yarmouth Roads: Passing out of the estuary off the North Foreland one Sunday morning after a few days of strong north-east wind, the funnels and masts of a steamer, sunk the day before, were sighted and cleared; an hour afterwards, when navigating along the edge of the outlying sand, an enemy submarine came to the surface close to the vessel and between her and the sand. Seeing the dangerous

position she was in the submarine put her head off, submerged at once, and presumably steered away to more open waters. Shortly after, three enemy floating mines were sighted, and the vessel slowed down and signalled their position to a destroyer. Proceeding, a big Dutch steamer, all down by the head with her fore-foot blown away, was sighted and passed close to; ten miles further on more floating mines were seen, a destroyer being on the spot firing at them; between Harwich and Aldeburgh a grain-laden vessel on the starboard bow, about half a mile away, was suddenly blown up and sank stern first, and ten minutes afterwards a little patrol-boat going to rescue the crew was blown to atoms, not a soul being saved; between Southwold and Lowestoft a fleet of mine-sweepers and submarine chasers were endeavouring to locate and destroy an enemy submarine before night came on. Arriving at Yarmouth just before dark the vessel anchored. None but those who have had the responsibility under such conditions can quite realise the feeling of relief experienced on reaching comparatively safe waters.

Let nobody think that because the part these men played was not shouted from the house-tops, for obvious reasons, that theirs was an insignificant one; two articles, one in *Lloyd's List* and one in *The Times*, after peace was declared, was the total advertisement given them. The fact remains that the pilotage service, especially of the large ports, was a very valuable national asset during the war; and in time of peace it is a necessary adjunct to our great mercantile marine.

Thus has pilotage grown, keeping pace with the growth and development of shipping in the kingdom. It is an ancient and honourable craft, and to perform its duties properly resolute, unselfish, and patriotic men are essential.

HARRY DAVIS.

CHAPTER XI.

The State and Merchant Shipping.

The entry of Governments into the business of shipowning was discussed in a chapter contributed by the writer to last year's issue of the "Annual." The outline of events then given showed that Governments did not own and operate ships commercially in competition with private shipowners until after the late war. For military purposes, the Governments allied in opposition to the Central European Powers had, during hostilities, assumed control of nine-tenths of the world's merchant shipping, and a great deal of it they not only controlled but owned. In this country control ceased and the "standard" merchant ships built to Government order, as well as ex-enemy tonnage surrendered under the Treaty of Versailles, were, after the war, made over as promptly as possible to private owners. In America, the Government apparently intended, in course of time, to pursue the same policy, but had decided to build up an adequate merchant marine under its own flag, and somehow, in the double process, policy became confused. The bureaucrats with little or no knowledge of shipping who were supposed to be running the business while gradually transferring it, found the problems much more intricate and difficult than they had expected. Indeed, they did not conduct the affairs they had in hand with any success at all, and if the long pocket of the taxpayers had not been available, the Government shipping business would have been, in the words of Mr. Lasker, who took over the chairmanship of the United States Shipping Board, "the greatest bankruptcy ever recorded."

In France, the failure of the State scheme was recognised, and the loss of liquidating the Government merchant fleet was faced as speedily as possible.

The Governments of Australia and Canada built up commercial fleets with the intention, apparently, of continuing to operate the ships in international competition, not as a mere temporary expedient, but permanently. So far as it was possible to review the position last year, the Australian and Canadian State ships had, like nearly all ships afloat, no prospect before them other than that of barely paying their way, if by good fortune they did not involve their owners in heavy losses.

We take up the story, then, with the Governments of the United States, Australia, and Canada all in the shipping business; the former until it can work out a policy of establishing a merchant marine operated by private initiative, and the two latter on the footing of continuing trading for an indefinite period, though the Australian Government—as will be explained in the course of this chapter—has announced an impending change in the method of operating its ships.

United States Policy.

The development of events in America has brought to the front, in connection with the question of State shipowning, problems which are of vital importance to the shipping of the whole world. A summary of these events will make apparent the grave issues arising.

A letter from President Harding, read in the United States Senate in September, 1921, discussing the Shipping Board situation, said that the unspeakable losses and unutterable wastes should be charged to the great war emergency. The staggering losses in operation, the President observed, could only be cured by a board of operators whose members knew something concerning the business, and men equal to the task were being acquired in place of "incapable men at excessive salaries."

Shortly afterwards, Mr. Albert Lasker, the chairman of the Shipping Board, in a speech at New York, after pointing out that the American nation was in possession of a fleet of 1,450 ocean-going steel ships, not to mention ferro-concrete and wooden vessels, said that half the first-named tonnage only ranged from fair to usable. In the successful operation of the Shipping Board's vessels lay the immediate hope of the establishment of an American Merchant Marine. The Shipping Board, the chairman considered, had three great responsibilities: first, the operation of the fleet which it inherited, pending its sale to private owners; second, the liquidation of its assets; and third, but far most important of all, the application of the Jones Act. As to the last point, Mr. Lasker said that America could not gain trade on the seas without displacing the existing trade enjoyed by foreign ships. The Jones Act must be given life by the present Board.

These references to the Jones Act (as the Merchant Marine Act of 1920 is commonly called) were significant. The parts of the Act remaining inoperative were the discriminatory provisions which ex-President Wilson had declined to enforce. To put them into operation would have involved, probably, the denouncing of treaties restricting the right of the United States to discriminate between foreign and national ships both as to the Customs duties on imports and as to tonnage dues on ships. In other words, the policy of the United States Shipping Board, confronted with the problem of what to do with the State-owned merchant fleet, was declared to be a policy involving international complications.

The Subsidy Proposals.

In fact, steps were taken to give effect to this policy by the introduction into Congress of a Bill containing discriminatory provisions similar to those in the Jones Act which had been allowed to remain inoperative, the proposals being equivalent to the granting of a subsidy to American vessels at the expense of foreign shipping.

In April of this year, Mr. Lasker, in a statement before a Senate Committee dealing with the subsidy programme, declared that Government aid was essential for the building up and maintenance

of the American Merchant Marine and necessary to enable the Shipping Board to dispose of the Government-operated fleet. At this time, when nearly 1,000 of the ships were laid up, and less than half that number were being operated at heavy loss, Mr. Lasker made a curious admission. The purpose of Government operation, he pointed out, was to build up trade routes in order that the ships might be sold with established goodwill to private owners; but this method had defeated its own purpose, for, in operating ships to build up routes, the Government had driven its potential customers largely off the seas! So State sea trading had landed those concerned in a dilemma, and the way of escape they proposed was to take steps menacing international trade on which hope of a world recovery largely rests.

Commenting, during May, on the American legislative proposals, Sir Norman Hill pointed out that, though it was within the competency of the United States to grant any subsidy to its own merchant shipping, or to restrict its imports or exports, any attempt to go further by penalising in its ports the ships of other nations raised entirely different considerations. While sympathising with the hope that the American merchant fleet might be used to the best advantage of oversea commerce, Sir Norman Hill expressed the opinion that the policy of the United States would strike directly at the prosperity of that commerce and the commercial peace of the world. "There will be room in the world," he declared, "in free and open competition, for the American Merchant Marine if, working together, we can re-establish international credit and thereby international commerce; but no heavier blow can be struck against the re-establishment of international commerce than the denial of equality of opportunity to all ships, under all flags, in all ports of the world."

At the time of writing, the fate of the Subsidy Bill had not been determined, but the possibility of its reappearance next session in an altered form was being discussed.

Canadian and Australian Losses.

While during the war the Americans built whatever type of ship could be put together most expeditiously, regardless of its ultimate commercial value in peace time, the Canadians built with a definite policy for the future, and the results of operating their fleet might accordingly have been expected to be more favourable. The report of the directors of the Canadian Government Merchant Marine presented to the Dominion House of Commons in June showed, however, a deficit of over eight million dollars for last year, after deduction of all charges, including depreciation and interest. Apart from the two last-mentioned headings, the loss—that is, the loss on actual working—was over two million dollars. It was recommended that the smaller vessels should be disposed of, so as to reduce the fleet of 65 to a total of 37 vessels, and that their capital cost should be reduced to what might be considered replacement value.

The Australian loss does not appear to have been made public. In a statement to the Australian House of Representatives on Nov.

COMMONWEALTH GOVERNMENT LINER JERVIS BAY.

Built and engined by Messrs. Vickers, Ltd., Barrow-in-Furness.

16, 1921 (as reported in the Australian "Hansard"), the Prime Minister, Mr. Hughes, gave figures of net profit for five years, but did not state in which years profits were made. He admitted that some of the ships had then had to be laid up because it did not pay to run them. In a subsequent debate, on November 29, he admitted that the peak was reached in 1919, and that since then they had been "sliding down" and were "in for a period of lean years," though apparently he considered that, by careful management, it might be possible to make ends meet. They could only do that, however, Mr. Hughes pointed out, by writing down the value of the ships. There was some very strong criticism in the course of the debate—one member, who had closely analysed the figures, said he saw no hope of the ships paying their way for years—but it was decided to continue the Commonwealth Line of steamers, and not to accept an offer which had been received from Lord Inchcape that the Conference Lines to Australia should either buy the Commonwealth Line or sell their own ships to the Australian Government.

Mr. Hughes had, in his first statement, made it clear that, if the line was retained, legislation would be introduced to create a corporation or trust, or some body analogous to the Railways Commissioners, or the Governor of the Commonwealth Bank, and that the line would be run as a business concern under such control.

The inauguration of the Commonwealth Government Line's new service of fast passenger and cargo steamers to Australia took place with the sailing from London in December, 1921, of the Moreton Bay. All the five "Bay" steamers, which were built in Great Britain at a cost of a million apiece, have now been brought into service. They were contracted for at a time when prices were high, and there would necessarily be a heavy loss should they be sold.

Australia has decided to discontinue shipbuilding as a Government enterprise, and in view of Mr. Hughes' statement above referred to, it was not surprising that, when the Budget was introduced in August, it was definitely announced that the Commonwealth Line would be placed under independent control, properly capitalised, and competing with other shipping companies. Whether this means the adoption of the Canadian method, under which the taxpayers still have to bear loss, is not yet altogether clear. Before the Budget announcement there had been considerable trouble between the Government and the Australian Seamen's Union.

The Competitive Aspect.

From the course which events are following, it seems clear that, for some time at least, there will be a continuance of the operation of merchant ships by some Governments. State shipping enjoys advantages which are denied to private owners, and (as was pointed out in discussing the subject in last year's "Annual") so long as the sea carrying trade of the world is conducted partly by Government ships and partly by those privately owned, the former will compete unfairly with the latter. This aspect of the problem has, during the past year, attracted much attention, and the Chamber of Shipping of the United Kingdom has initiated a movement which aims at abolishing

the immunity from various obligations enjoyed by States in respect of their commercial shipping. It is felt that, if Governments engage in trade, they should do so on the same footing as the owners of ordinary merchant ships. At present they certainly do not. They enjoy first of all immunity from taxation, and, in addition, they are frequently able to claim immunity from legal obligations on putting in the plea that the ships are State property.

"It is impossible" (declared a statement issued by the Chamber of Shipping) "for private shipping, often paying income tax in two or more countries, to compete with State-owned shipping paying no income tax in its own, and successfully claiming immunity from taxation in every other country."

There is here a double grievance: first, that ordinary shipping is overcharged in the matter of income tax, and secondly, that State shipping goes free. Apparently some cunning, though short-sighted, British tax official originated the idea of claiming income tax from foreign shipowners, with agents in this country, on the earnings of their ships visiting our ports. The United States followed suit, and Australia also. Norway is prepared to impose the same burden, and no doubt, unless a halt is called, other countries will do the same, in which case we, as the country with the largest shipping trade, shall pay most. The United States law, however, gives exemption to the ships of countries which allow exemption to American ships. The House of Commons, in July, rejected a proposal to insert a clause of this kind in the Finance Bill, and so, unless common sense prevails, privately owned shipping is faced with the prospect of having to pay double, treble, or more income tax, while the State shipping with which it competes goes free.

State Freedom from Other Obligations.

And State ships can, metaphorically, snap their fingers not only at claims for taxes, but at demands for the fulfilment of those ordinary everyday obligations which are enforceable against individuals or companies by process of law. That is the second kind of immunity to which objection is taken. This immunity is allowed by the laws of our own and some other, but not all, countries. The diversity of rule and the grounds on which the immunity is given need some explanation.

The matter can perhaps best be made clear by referring first to a notable case in which, over forty years ago, the principles which, in this country, govern the matter were laid down. This was the case of the Parlement Belge, a packet belonging to the King of the Belgians, which collided with a British ship near Dover. In the course of the legal proceedings which followed, the Court of Appeal held that a ship belonging to the Sovereign of a foreign State is not liable to be seized in a collision action, and that this immunity is not lost by reason of the ship's being employed in trading. Shortly put, the rule is that States respect each other's independence, and decline to exercise, through their courts, any jurisdiction over the Sovereign or the property of another State.

Lord Justice Scrutton's Judgment.

Before the war, there were so few Government vessels, other than warships, that no particular inconvenience resulted from this rule, but since States have taken to owning ships and employing them in trade, difficulties have arisen. A much discussed case which occurred in 1919 is illustrative, and cannot be stated better than by quoting from the judgment delivered by Lord Justice Scrutton in the Court of Appeal.

"The Porto Alexandre (said his Lordship) came into the Mersey, got on to the mud, and was salved by three Liverpool tugs. On arresting her to obtain security for the payment of their salvage, the Portuguese Republic, through the Portuguese Chargé d'Affaires, put forward a statement that she was a public vessel of the Portuguese Republic, and was therefore exempt from any process in England. Accordingly the defendants moved to set aside the writ and arrest. Hill, J., in the Admiralty Court granted the application and the plaintiffs appeal to this Court."

The Court of Appeal, however, the Judge pointed out, was bound to follow the above-mentioned decision in the case of the Parlement Belge, and therefore dismissed the appeal, though Lord Justice Scrutton added very significantly, "If these national ships wander about without liabilities, many trading affairs will become difficult; but it seems to me the remedy is not in these Courts. The Parlement Belge excludes remedies in these Courts. But there are practical commercial remedies. If ships of the State find themselves left on the mud because no one will salve them when the State refuses any legal remedy for salvage, their owners will be apt to change their views. If the owners of cargoes on national ships find that the ship runs away and leaves them to bear all the expenses of salvage, as has been done in this case, there may be found a difficulty in getting cargoes for national ships. These are matters to be dealt with by negotiations between Governments, and not by Governments exercising their power to interfere with the property of other States contrary to the principles of international courtesy which govern the relations between independent and Sovereign States."

Diversity of National Laws.

The principle laid down in the case of the Parlement Belge and applied in that of the Porto Alexandre and a number of other instances, is that to which effect is given by the law not only of England but of most countries. The courts of a State decline jurisdiction over the Sovereign or the property of another State. By way of exception, the Italian and Belgian courts in some recent instances have not allowed immunity where the property in question has been a ship belonging to a foreign State, but employed for ordinary commercial purposes. The general rule, however, gives immunity even to the trading ships of a State in the courts of most countries.

So much for claims where the State against which a claim arises is foreign. Where the claim is by a subject against his own State, the rule in England is the same. There is no redress as a matter of right: only as a matter of grace is anything obtainable. In France, Holland,

Norway, and indeed in continental countries generally, the rule is the reverse, and a subject may take proceedings against his own State.

With this diversity of rule and practice there is a great risk, in the international business of shipping, of sufferers from illegal acts being very often shut out from obtaining settlement of a claim by reason of its being against a Government. Shipowners may have to put up with whatever remedy a Government chooses to concede in cases of collision, salvage, towage, freight, and other matters. Cargo owners may be unable to sue for short delivery. Merchants supplying stores may be unable to take proceedings to obtain payment, while underwriters, bankers, dock and harbour authorities, ship repairers, and others may all, in the same way, find themselves shut out from redress.

The only complete, and perhaps the most satisfactory, remedy for these evils would be to do away altogether with State trading by sea. That remedy is, however, not available at present, and it is therefore desirable, if possible, to introduce uniformity in place of the diversity of law, and, in settling a new uniform basis, to do away with the unfair immunities which State trading ships enjoy under rules established before anyone contemplated that Governments would launch out into these commercial activities.

It should be recognised that not only those who may have business dealings connected with ships are concerned in bringing about a change in the legal status of State trading ships. The matter affects the public at large because, if these ships are outside the law, they are exempt from the obligation of complying with any safety regulations whatever, and neither seamen nor passengers have any assurance that they will be protected by compliance with requirements of that kind.

Proposed International Convention.

The proper method, undoubtedly, of dealing with a situation such as now exists is that all maritime States should meet in conference and agree upon a statement of the principles into conformity with which they will bring their respective national laws. In other words, an international convention should be drawn up, and legislation on the lines prescribed should follow in the various countries. The holding of such an international conference at an early date is the purpose which the Chamber of Shipping has had in view in moving in the matter. An official international conference, however, cannot usefully foregather until the ground has been prepared, and the preparations, in a question of this kind, involve the co-operation of business men with jurists. Before a common basis can satisfactorily be settled, a good deal of preparatory work must be done in comparing national laws and points of view. There are technical questions to be discussed in working out a practical solution of the difficulties which are to be removed. It is therefore fortunate that the Chamber of Shipping is acting in collaboration with the Comité Maritime International, a body which has already been successful in establishing uniformity in some of the rules of commercial maritime law where divergencies had been found in business experience to be productive of inconvenience.

Probably much of the success which has attended the activities of the Comité Maritime International is due to the common-sense plan of business men being associated with commercial lawyers in its deliberations, though the fact that it has achieved definite results is due very largely to the vigorous personality of M. Louis Franck, of Antwerp, who, in conjunction with the late M. Charles le Jeune, founded the organisation and is now President of the Comité, in addition to being Minister for the Colonies in the Belgian Government. The method followed is to prepare a comparative statement with the aid of materials supplied by reports from national committees in the maritime countries, and then, at a conference, to discuss the draft of an international convention dealing with whatever subject is in hand. A satisfactory basis is thus formulated for the later work of an official diplomatic conference which settles the final form of the convention.

The London Conference.

The British National Committee associated with the Comité Maritime International met in London in June under the chairmanship of Sir Henry Duke, the President of the Admiralty Court, Sir Maurice Hill, the other Judge of the Court, who has taken a very keen interest in the State immunity question, being also present, with a number of prominent shipping representatives and legal men. A report was then adopted dealing with the question of the immunity of States in respect of proceedings against their maritime property, and other national committees also reported to the Permanent Bureau of the Comité. Following upon this, a full conference, at which the various nationalities were represented, was held in London in October, 1922, to discuss a draft of the proposed international convention.

The principles to be recognised by the convention, it had been suggested in an official communication issued by the Chamber of Shipping before the holding of the conference, should include the following:—

"1. That all maritime property owned by or in the possession or service of a Sovereign State whether national or foreign, other than property being used solely for purposes of war, should, as regards the rights, privileges, and liabilities conferred or imposed by the law of any country, be placed on precisely the same footing as private-owned maritime property under the law of that country.

"2. That maritime property owned by or in the possession or service of a Sovereign State and being used solely for purposes of war should, as regards the rights, privileges and liabilities conferred or imposed by the law of any country, be placed on the same footing as private-owned maritime property under the law of that country, provided that such property shall not be subject to arrest if it is owned by or in the possession or service of a State which has made provision either generally or in the special case for the giving of security in lieu of arrest in the courts of the country where the proceedings are instituted."

Agreement with the movement to standardise internationally rules of law defining as above the position of State shipping had been expressed by a number of leading commercial organisations, including

the International Chamber of Commerce, the Association of British Chambers of Commerce, the Bankers' Association, the Committee of Lloyd's, the Dock and Harbour Authorities' Association, the Manchester Association of Importers and Exporters, and the Shipbuilders' Federation. The support of these bodies and the character of the communications received from other countries, showed that the movement commanded very wide and influential support. In view of the interest taken in the question, a statement was issued on behalf of the Canadian and Australian Government-owned lines, pointing out that they both voluntarily and unreservedly submit to the ordinary jurisdiction of any court, and agree to be held subject to the ordinary procedure in the same manner as any private owner. This, of course, was satisfactory so far as it went, but it did not touch the point that it should be possible to take proceedings to enforce obligations, not as a matter of grace, but as a right, and the proceedings at the October conference of the Comité in London made it clear that the international shipping community, and the commercial interests concerned, are bent upon securing an alteration of the present state of affairs.

After a very full discussion of the matter a resolution in the following terms was submitted to the conference:—

"1. Sovereign States in regard to ships owned or operated by them and cargo owned by them and cargo and passengers carried on such ships ought to accept all liabilities to the same extent as a private owner.

"2. Except in the case of the ships and cargoes mentioned in paragraph 3 such liabilities should be enforceable by the tribunals having jurisdiction over and by the procedure applicable to a privately owned ship or cargo or the owner thereof.

"3. In the case of

(*a*) Ships of war;

(*b*) Other vessels owned or operated by the Sovereign State and employed only in Governmental non-commercial work;

(*c*) State-owned cargo carried only for the purpose of Governmental non-commercial work on ships owned or operated by the Sovereign State;

such liabilities should be enforceable by the like tribunals but only of the State by which the ship is owned or operated, and should be enforceable by action *in personam* against such State, and, in addition, by any other form of procedure permitted by the law of such State."

Sir Maurice Hill, who moved this resolution, observed that the essential thing was to secure unanimity on lines which it was thought all Governments could be induced to accept. The conference unanimously adopted the resolution with a view to further action being taken by way of bringing it before an international diplomatic conference, and securing, ultimately, that it should form the basis of an international convention. Should such a convention be agreed upon, legislation would then be brought forward by the Governments of the various countries to give effect to its terms.

SANFORD D. COLE.

WHITE STAR LINER PITTSBURG.

Built and engined by Messrs. Harland & Wolff, Ltd., Belfast.

CHAPTER XII.

The Economic Status of the Seaman, 1914–1922.

Industrial history has a knack of frustrating the division into arbitrary compartments of what is rather a continuous process of development. Since for seamen, as for labour in general, the war brought great bargaining power and high nominal remuneration succeeded by large wage-reductions and comparative economic helplessness, the historian is tempted to regard this "rise, ripeness, and falling-off" as a separable era to which a neat "Finis" may be appended. In the case of seamen, such a view tends to overlook a solid measure of attainment which has outlasted the war. Surveying briefly the past eight years, we are concerned not so much with certain evanescent and, as will be seen, largely illusory advantages born of and departed with the period of inflation, as to indicate those developments in the seaman's status, as comprised by his pay, his conditions of service, and his relations with his employers, whose permanence seems more assured and whose progress is more important.

Prior to 1917, seamen's wages, though subject partially to collective bargaining, were not regulated or upheld by national agreement, and varied in different ports and individual ships. By the end of the third year of hostilities, rising prices had seriously affected the purchasing power of money, and had not, in all cases, been off-set by readjustments of wages on the part of individual ownerships. At this juncture, the National Maritime Board was constituted under the ægis of the Shipping Controller as a Joint Council for Shipping on the broad lines of the Whitley Report, and National Standard Rates for all grades of seafarers were established.

Rise and Fall in Wages.

Table I. on p. 304, summarises the subsequent course of wages on foreign-going vessels. The rates for able seamen, which form the basis for all other rates, have been taken as typical, and in the third column are shown as an index compared with an assumed pre-war average wage of £5 5*s.* per month. The corresponding index for shore wages, given in column 5, is that prepared by Professor Bowley. In the sixth column is indicated the effect of price-changes on the purchasing power of the nominal wage. A diagram illustrating the complete period is also given on p. 304.

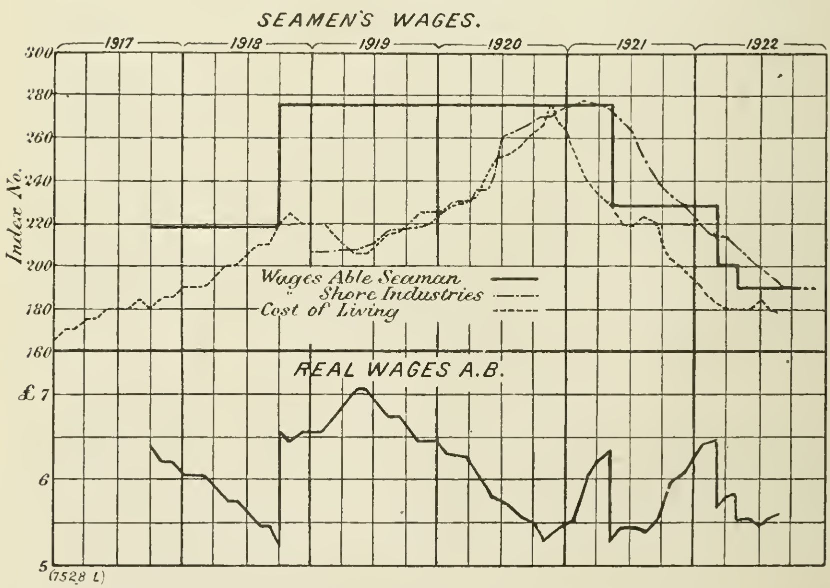
The establishment of a national standard wage represented the fulfilment of a long-cherished aim for the seamen's representatives.

They also brought to the negotiations which preceded standardisation a strong conviction that the seaman's pre-war wage had been unsatisfactory. Their contention was perhaps not easy to traverse,

TABLE I.—WAGES RATES FOR ABLE SEAMEN.

(PRE-WAR = 100.)

Date.	Standard rates, A.B.			A.B.'s wage index.	Cost of living. Ministry of Labour index.	Shore wages index.	"Real wage" A.B.		
	£	s.	d.				£	s.	d.
1917, October . . .	11	10	0	219	180	—	6	7	9
1918, August. . . .	11	10	0	219	210	—	5	9	6
,, October . . .	14	10	0*	276	220	—	6	11	9
1919, May	14	10	0*	276	205	—	7	1	6
,, October . . .	14	10	0*	276	220	218	6	11	9
1920, May	14	10	0†	276	241	253	6	0	3
,, November. . .	14	10	0	276	276	274	5	5	0
1921, April . . .	14	10	0	276	233	271	6	4	6
,, June	12	0	0	228	219	264	5	9	6
,, December . . .	12	0	0	228	199	223	6	0	9
1922, February . . .	12	0	0	228	188	214	6	7	9
,, March	10	10	0	200	186	214	5	13	0
,, May	10	0	0	190	181	204	5	10	6
,, September . .	10	0	0	190	179	192	5	11	9
,, winter (estimate).	10	0	0	190	175	—	5	14	3



and the high freights ruling, the dangers of war, and the influence of Government control all tended to the seafarers' advantage. Wages were standardised for able seamen at £11 10*s.*, a figure, as will be

* Including war risk bonus. † Consolidated wage.

noted from the table, well in advance of what was necessary merely to maintain a pre-war purchasing power, or "real wage" of £5 5*s*. Unfortunately, the rise in prices continued, and by October, 1918, the whole of the "real" advance gained had run off. The position was then readjusted in the seaman's favour by the grant of a war risk bonus of £3 per month.

The Armistice was followed by a marked fall in prices, and the first eight months of 1919 saw the high-water mark in the prosperity of seamen from the point of view of the "real wage." Thereafter, inflation was reproduced in soaring retail prices, and the seafarer, though having his own food on foreign-going vessels provided by the owner, suffered loss of general purchasing power with the rest of the community. In May, 1920, the National Maritime Board merged the war risk bonus into wages, but as this represented a gain more technical than palpable, the continued rise in the cost of living brought by midsummer a strong demand for a substantial increase in wages all round. Although freights were still near their "peak," the seafarers' proposals were resisted by the shipowners' representatives for the declared and, as the event proved, weighty reason that they foresaw the approaching end of the post-armistice boom. The seafarers' leaders finally deferred their demands for six months. In the autumn came the beginning of the slump in freights; by November retail prices passed their "peak"; deflation and depression had set in, and all chance of higher nominal wages was over.

For their failure to obtain a wage increase in 1920, the seamen's leaders were criticised by extremists among the rank and file. Probably they could have utilised the conditions then existent to extort temporarily higher rates, but it is certain that such gains could have had no permanence, and had the industry been saddled in 1920 with enhanced wage-costs extending, as they must have done in many cases, over long contracts, the effect would have been to aggravate the financial strain of the ensuing slump, with disastrous repercussions on the seamen themselves. For the conservative policy of their leaders in 1920, the seafarers soon reaped full benefit when the economic boot had changed legs.

It will be borne in mind that, in 1921, shipping suffered from the peculiar difficulty in that freights fell far sooner and more violently than either material prices or the cost of living. Unemployment of ships and men grew rapidly, with consequent weakening of the Maritime Unions' bargaining power. The continuance of war-time wages and conditions became economically impossible, and there was obvious danger that, failing broad views and good will on the part of the organised shipowners, the whole structure of agreements won by the seamen might be jettisoned. A glance at the table and diagram on p. 304 will show that the inevitable deflation of seamen's wages in 1921 and 1922 was accomplished with, probably, the minimum of hardship to the seafarer, taking into account the accompanying fall in retail prices, and regard being had to the economic situation of the industry.

The reduction of £2 10*s*. agreed in May, 1921, momentarily lowered the "real" wage to pre-war level; but by the end of the

year, through falling prices, the purchasing power of the reduced wage had been restored to £6. The next reduction, proposed by the shipowners for December, 1921, was eventually postponed until 1922, when further reductions were agreed of 30*s.* and 10*s.* on March 1 and May 1, respectively. Even so, assuming that no immediate alteration awaits the present standard rate of £10 for able seamen, and that the cost of living is likely to be stabilised for some time round 75 per cent. above 1914, we find that in spite of nearly two years' depression in shipping the seaman will have still managed to retain not only the all-important principle of established national rates, but a present "real" wage roughly 10*s.* per month higher than in 1913–14—a period of good shipping trade.

TABLE II.—WAGES RATES FOR SENIOR RANKS AND RATINGS.

(Cargo Steamer of 6,000 Tons Gross.)

	Typical wage, 1914.	Same wage increased 75 per cent.	Actual standard rate, 1922.	Gain (+) or loss (−).
	£ s. d.	£ s. d.	£ s. d.	
1st Engineer	18 0 0	31 10 0	28 10 0*	−60/-
1st Mate / 2nd Engineer	13 0 0	22 15 0	21 10 0†	−25/-
2nd Mate / 3rd Engineer	10 0 0	17 10 0	17 0 0	−10/-
Carpenter	7 5 0	12 14 0	12 10 0	−4/-
Boatswain	6 7 6	11 3 0	11 10 0	+7/-
Fireman	5 15 0	10 1 0	10 10 0	+9/-
A.B.	5 5 0	9 4 0	10 0 0	+16/-

THE FUTURE COURSE OF WAGES.

The future course of wages depends on incalculable factors. At the same time, the seafarers' representatives in the negotiations which resulted in acceptance of the last reductions secured a condition which should provide a sound basis for future development. In getting an agreement that the 1922 reductions should depend on the position of freights, Mr. Havelock Wilson and his colleagues appear, wisely, to have discarded the cost of living as a permanent basis for assessing wages, and to have paved a way for recognition of the principle that the remuneration of the worker is in a real sense dependent on the revenues of the industry, with the corollary that joint co-operation and sacrifice in bad times carries with it the right to a full share of any succeeding prosperity.

The wages of senior ranks and ratings are too complex for their trend to be chronicled in detail. As stated, they have been throughout related, with modifications, to the A.B.'s rate. Broadly speaking, the higher ranks came off unfavourably at sea, as on shore, in comparison with the lower. Table II., above, attempts to show the relative positions, pre-war and under (roughly) present conditions, of

* With three years' seniority. † Begin-at rate.

the various grades on a typical cargo vessel. The actual wages now paid are contrasted with a theoretical wage arrived at by adding 75 per cent. all round to typical pre-war rates.

In the foregoing review of wages, no account has been taken of cash additions paid for overtime worked. How considerable such additions were for a period, can be gauged from the fact that in 1920, whereas A.B's. wages had increased by 176 per cent., the total increase in the average ship's wage bill, including overtime payments, was estimated to be 243 per cent. These conditions, however, which chiefly related to the catering department, have, as will be shown, largely ceased to exist, and labour costs afloat may be fairly estimated to have fallen from 243 to perhaps 80 per cent. above pre-war level.

Work in Port.

In dealing with conditions of service other than pay, attention is naturally first attracted to hours of labour. For shipping, the question is twofold. In port the work to be done by a ship's crew falls, with certain exceptions, within the hours customarily worked by shore labour handling cargo. While a ship in port is never "shut down" like a factory, its main activities cease, as a general rule, by night and on Sundays. Thus, without undue difficulty, in 1918 an agreement for insertion in ships' articles was concluded between the shipowners and the seamen's representatives, providing, broadly, for deck and engine-room officers and hands a working week in port of 45 hours, with 46 hours for the catering department. The working day was limited to the usual hours of the land worker, days of arrival and sailing being, however, excluded from the agreement. This regulation of work in port remained unaltered until 1921, with the exception that the stewards' representatives took advantage of conditions in 1920 to secure a stiffening of their agreement with formidable increases in the hourly rates of overtime.

The Conditions of Work in Port for Officers.

In July, 1921, the conditions of work in port were revised for all grades, in the light of depressed trade. Owing to difficulties in securing agreement on modified practice, the complete discontinuance of overtime payments to navigating and engineer officers was eventually pressed by shipowners with such emphasis that the officers' representatives, after unfruitful protests, had to accept the inevitable. Apart from the paramount need for reduction in running costs, the payment of overtime to executive officers was generally disliked by owners as incompatible with the position of officers and wrong in principle. The remuneration of officers should, they held, cover their full and whole-hearted services as required. Whatever the justice, in some instances, of this contention, the officers' representatives attached great value to the now cancelled agreement limiting officers' hours in port, and while it might be argued that the rules in their working were never an unqualified success, there is perhaps

ground for hoping and believing that they set a standard which, though no longer obligatory, will in the future be widely observed. In the writer's personal opinion, it is unlikely that the working hours of officers in port will again be subject to the rather unwieldy and inelastic method of regulation by penal clauses defining overtime. It must be borne in mind that officers have enjoyed, since 1918, an agreement providing for fourteen days' holiday on full pay for each year of continuous employment. Moreover, in the case of officers, the problem of agreeing upon a manning scale, ample enough to ensure that no individual is habitually overworked, presents in times of normal trade fewer technical and financial difficulties than it does for the rest of the crew. It seems probable that the solution of any future difference with regard to officers' working hours, either in port or at sea, lies in the direction of an agreed minimum manning coupled with periods of leave on pay.

The Eight-Hour Day in Port.

The 1921 revision of conditions was much less drastic in the case of deck and engine-room hands. The principle of an 8-hour day and a 45-hour week was, broadly speaking, maintained, while an actual improvement in conditions was secured by agreement limiting working hours on days of arrival and sailing to 12 hours on deck and 9 hours in the engine-room. In return, the seamen's representatives conceded the right of managements to require a few members of the crew (usually in rotation) to work in shifts any 8 hours per day Monday to Friday, 5 hours Saturday, 4 hours Sunday, for the purpose of carrying on by day or night, without overtime, those routine activities on ships in port whose continuance is essential. It was also agreed that equivalent time-off granted during working hours should be reckoned as off-setting cash payments for overtime worked. The agreement, as a whole, appears to have represented a fair compromise for all parties, regard being had to the circumstances of the present time. Bills for overtime have been reduced, but the principle of reasonably limited hours remains as a solid groundwork.

In the case of the catering department it will be apparent that any arrangement limiting the hours of work to 7 a.m. to 5 p.m. was bound to prove exceedingly expensive in overtime. In 1921, the organisation then representing that department on the National Maritime Board declined to co-operate in revising wages and conditions, and seceded from the Board. Pending fresh agreement of working conditions for cooks and stewards, the old regulations lapsed entirely, and ruling practice, at present, makes the catering department's working day in port 8 to 9 hours actual time worked within 16 hours between commencement of duty and midnight, weekdays and Sundays alike. Without pre-judging the future or implying that these conditions are, in better times, not susceptible of improvement, it is safe to assert that future agreements are bound to make some allowance for the necessarily intermittent and "spread-over" character of the stewards' work.

Working Hours at Sea.

The question of regulating working hours at sea beyond the extent to which they are limited by normal sea-practice has proved a much more difficult issue. Agitation for reduced hours assumed considerable proportions from 1919 onwards, was strengthened by the Washington Conference in November of that year, and received a fresh impetus in international form through the assembly of a Conference at Genoa, in June, 1920, definitely to consider a 48-hour week at sea. Prior to that conference, British shipowners were prepared, and offered through the National Maritime Board, to make very considerable increases in manning. These concessions were declined by the seafarers' representatives as being inadequate, and not embodying (as they admittedly failed to do) the principle of a 48-hour week. The Genoa Conference failed to reach agreement, but negotiations, with a view to reducing hours at sea by agreement as to increased manning, continued, both at the National Maritime Board and through an international joint commission of shipowners and seafarers. Apart, however, from the immediate depression in the shipping industry, the technical difficulties of standardising manning by agreement have, except in a few localised instances, so far proved insurmountable, and the working week at sea remains, as before the war, for watchkeepers on deck 84 hours, in the engine-room 56 hours.

On most larger foreign-going vessels, deck officers are organised in three watches, thus providing a 56-hour week. In the catering department, hours of duty amount to from 70 to 84 per week on an average. For those members of the deck and engine-room departments whose time at sea is not divided into watches, and who normally work only during daylight, *e.g.* carpenters, storekeepers, etc., a working week at sea of 50 hours is secured by agreement.

Ship *versus* Factory Conditions.

The future of working hours at sea is clearly an issue of vital interest, not only to the seafarer, but also, in its bearing upon the cost of sea-transport, to the community. To an impartial observer certain factors in the problem appear unescapable. On the one hand, to reckon technically as overtime all hours worked per week in excess of a fixed number is in practice simply to increase the monthly wage without decreasing the hours of labour, and while this may be regarded as merited compensation, the generally voiced claim of the seafarers' representatives that more rest at sea is required, remains unaffected. On the other hand, in a ship, as opposed to a productive industry on land, shorter hours cannot be offset by more intensive work and greater output. Either the quantity of essential work must be reduced or the crew increased. The second alternative involves both directly a higher running cost, as expressed by the wages and food of the extra men, and indirectly a reduced earning power for the ship, by reason of the necessary conversion into crew's quarters of space otherwise available for

passengers or cargo. Failing, therefore, a successfully enforced international agreement on the part of shipowners to keep freights and passage rates at an enhanced level, the most enthusiastic supporter of the seamen's legitimate claims for rest and leisure commensurate with that enjoyed by his fellow worker on shore, is constrained to recognise and point out that the solution of the problem by increased manning must tend towards lowering the net revenue of the industry, the sole source from which the employed seaman can hope to secure good conditions and pay for himself. Nor, on the same basis, would the enlargement of crews render easier the provision of that ampler and better accommodation on board ship which is so generally desired.

There exist, undeniably, the cases of the "hard" ship, and on the best of vessels the hours of duty (the word is advisedly chosen) are, at sea, admittedly long. The above presentment of the problem by no means suggests that all increases of manning above present practice are unwarrantable. All that it is intended to convey is that, in the seamen's best interests, the policy of larger crews, which the presence of numbers of unemployed naturally makes attractive, must on economic showing be limited by the opposing ideals of good wages and accommodation for the individual.

Economising Labour in Ships.

Alternatively, there is the possibility of decreasing the amount of work. The seaman, observing the great potentialities of the internal-combustion engine in the direction of labour-saving, is bound, sooner or later, to voice a demand that on ships of greater efficiency working hours should be reduced. So long as such ships were competing only with vessels more expensive to run, the question might prove easy of adjustment. The difficulty is that the introduction of successful labour-saving machinery at sea spreads rapidly, and competition between "efficients" springs up. The problem, now temporarily quiescent, is bound to engage the constant attention of the industry as soon as trade recovers, and is probably insoluble without some measure of international agreement. That it is impossible of amicable solution is unthinkable. As regards the most important aspect of the question—the treatment of ships to be built—perhaps the general direction of settlement most probable is agreement as to the future share—be it in increased wages, shorter hours, better accommodation, or leave on pay—due to the seamen out of the "surplus value" to be created in each new and more efficient ship.

We have so far dealt only with the two obvious aspects of the seaman's status as expressed by his pay and his hours of work. There remains a third factor not less important for being more intangible.

The National Maritime Board.

There was at least a modicum of truth in the popular conception of the seaman of twenty years ago as something of an Ishmael in the

labour world—the victim of crimps and boarding-house keepers, badly organised, sometimes oppressed by a bad employer with no means of redress, a helpless and improvident member of a "casualised" calling. By 1914, the position had been considerably modified, but the further improvement since registered is noteworthy. The year 1917 should be held as the *annus mirabilis* for the seamen. The establishment of the National Maritime Board as a Central Joint Council in London, with, in the case of sailors and firemen, district committees in every United Kingdom port, and joint officials in almost every dock, represented on the part of shipowners a new attitude of definite co-operation with the representatives of their employees. As a measure of the success of the policy of conciliation and conference "round the table," it will be recalled that there has been no important stoppage of work in the industry during or since the war. From the seaman's point of view it is true that what may be termed the "progressive legislation" of the Board has so far been limited to the not inconsiderable achievement of maintaining agreed standard rates of pay and conditions of work in port, with the addition of special agreements covering periods of leave on pay for navigating and engineer officers, free railway tickets for seamen discharged away from their home ports, remuneration for taking ships "by the run," and other minor matters. Apart from this, however, the Board established and continues to provide machinery whereby not only are engagements of crews carried out by a joint system worked in an orderly, dignified manner protecting the interest of the bona-fide seaman, but every case of dispute between a member of a ship's company and his employer is assured of investigation and, in ninety-nine per cent. of cases, agreed settlement by a tribunal or, if need be, series of tribunals composed of representatives of the organised employers and employed. When it is borne in mind that the individuals prepared to give their time to representing managements on joint labour councils are naturally most often men of liberal views, interested in the maximum of co-operation between capital and labour, the immense value to the employee of a system of semi-public investigations of complaints will be appreciated. And when it is realised that the National Maritime Board, since the end of the period of shipping control, rests on a purely voluntary basis, a tribute will be readily given to the remarkable good will on both sides, which alone makes possible the almost universal observance of the Board's general decisions and particular awards.

The Spirit of Reason between Owner and Seamen.

Joint Industrial Councils, of whatever type, are often criticised by labour as being dominated by the employers' representatives, who, holding the cheque-book, are always in a position to uphold a negative against everything but the use of successful force. The correctness of this theory admitted, the practical working of the National Maritime Board has secured for the seaman, in spite of difficult times, an increasing amount of the all-important element of good will on the part of shipowners. On the other part, the definite recognition by

shipowners of the right of the organised employees to a voice in the conduct of the industry, has resulted in an increasing confidence among seamen in the spirit of reason. For seafarers, socialisation of the industry in the form of nationalised ships has not been a serious issue. On the basis of private ownership there is the greater reason for satisfaction that a position should have been reached in which each side is prepared to give the other credit for good intentions.

To those who complain if material improvements are not continuously forthcoming in and out of economic season, the reply is that if a period of acute trade depression following an artificial boom has witnessed between seamen and shipowners a lessened mistrust, a growing appreciation of each other's point of view, and an awakening resolve that, however opinions on method may differ, all parties in the industry must join in helping to create fuller prosperity, bringing better and better conditions, the promise of the future gives every ground for confidence.

The days of small ownership—the days when it was easy to think that "Have-nots" sailed ships in the interests of recognisable "Haves"—are passing, and are nearly gone. In the face of continuous merging of shipping interests and the formation of gigantic blocks of capital, the future issue of harmonious working within the industry lies between the organised employees and managements; not individual owners. In such circumstances, the much misused term "community of interests" could have real meaning.

In the strength, numerical and financial, of their organisations, in the maintenance of what we have seen to be much, at least, of the principles that they won during the war, the seamen owe much to wise leading on the part of their chief representatives. To the same source they owe nothing more valuable than the psychological victory of having paved the way to recognition as partners in the business with their co-workers in direction and management.

G. A. VALLANCE.

APPENDIX TO NAVAL SECTION.

LIST OF BRITISH AND FOREIGN SHIPS.

The following abbreviations are used throughout the Alphabetical List :—

a.c.	Armoured cruiser.
a.g.b.	Armoured gunboat.
b.	Battleship.
b.c.	Battle-cruiser.
l.cr.	Light cruiser.
Flot. ldr.	Flotilla leader.
c.d.s.	Coast-defence ship.
P. L. Cr.	Protected light cruiser.
cr.	Cruiser.
A.A.	Anti-aircraft guns. (H.A. = High angle)
g.b.	Gunboat.
g.v.	Gun-vessel.
H.A.	High angle = A.A. Anti-aircraft.
H.N.S.	Harvey nickel steel.
H.S.	Harveyised or similar hard-faced steel.
K.S.	Krupp steel.
p.v.	patrol vessel.
t.	Turret-ship (in class column).
t.	Speed and H.P. at trials (in speed and H.P. columns).
s.c.	Sea-plane carrier.
to.cr.	Torpedo-cruiser.
to.g.b.	Torpedo-gunboat.
l.	Light guns under 15 cwt., including boats' guns.
M.	Machine guns.
sub.	Submerged torpedo tube.

The following abbreviations are used to distinguish the various types of boilers :—

W.T.	Water-tube boilers, where the type is not known.
B.	Belleville.
Bl.	Blechynden.
B. & W.	Babcock and Wilcox.
D'A.	D'Allest.
My.	Myabara.
N. or Nic.	Niclausse.
Nor.	Normand.
N.S.	Normand-Sigaudy.
T.	Thornycroft.
T.S.	Thornycroft-Schulz.
Y^1.	Yarrow small tube.
Y^2.	Yarrow large tube.

The following abbreviations distinguish types of turbines :—

P.T.	Parsons.
(G.)	Geared turbines.
C.T.	Curtis.
B.C.T.	Brown-Curtis.

A reference is now given in the ship tables to the plates in which diagrams of the ships appear.

GREAT BRITAIN.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.	Displacement.	Length.	Beam.	Draught.	Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons	
b.	**Ajax** 1925 *Pl.* 6.	23,000	555	89	27½	28,000 B. & W.	Greenock	Scott P.T.	1912	1913	1,937,631*	12–6	..	9	..	10	..	10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.* 2 *3-in.* A.A.	3	22 *t*	3150 / 850	900
b.	**Barham** 1935 *Pl.* 3.	27,500	600	90½	28¾	75,000 B. & W.	Clydeb'nk	J. Brown B.C.T.	1914	1915	..	13–6	3–1	6	4–2	10	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in* A.A.	4	25	Oil 2800	925
b.	**Benbow** 1934 *Pl.* 4.	25,000	580	90	28	29,000 B. & W.	Dalmuir	Beardmore P.T.	1913	1914	2,027,115*	12–8	1–2½	9–8	1–1½	10	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.* 2 *3-in.* A.A.	4	21	3250 / 1050 Oil	828
b.	**Centurion** 1925 *Pl.* 6.	23,000	555	89	27½	28,200 Y²	Devonp'rt	Hawthorn P.T.	1911	1913	1,939,648*	12–6	..	9	..	10	..	10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.* 2 *4-in.* A.A.	3	22 *t*	3150 / 850	900
b.	**Conqueror** 1922 *Pl.* 6.	22,500	545	88½	27½	29,835 B. & W.	Dalmuir	Beardmore P.T.	1911	1912	1,885,295*	12	..	9	..	10	..	10 *13·5-in.*, 14 *4-in.*, 4 *3-pr.*, 1 *3-in.* A.A., 5 M.	3	22·12	900 / 2700	800
b.	**Emperor of India** 1934 *Pl.* 4.	25,000	580	90	28	29,000 Y.	Barrow	Vickers P. T.	1913	1914	2,020,017*	12–8	1–2½	9–8	1–1½	10	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	4	21	3250 / 1050 Oil.	828
b.	**Erin** (*ex* Resha-dieh) 1922 *Pl.* 5.	22,940	525	91½	28½	26,500	Barrow	Vickers P.T.	1913	1914	..	12–4 K.c.	3	9–8	12	8	10	10 *13·5-in.*, 16 *6-in.*, 2 *3-in* A.A., 4 *6-pr.*	4 (sub.)	21·5	2000 / 700 Oil.	900
b.c.	**Hood** 1941 *Pl.* 1.	41,200	810	104	28½	144,000	Clydeb'k	J. Brown B.C.T. (G.)	1918	1920	5,843,039*	12–6	3–1	7–5	5–4	15–11	..	8 *15-in.*, 12 *5·5-in.*, 4 *4-in.* A.A., 4 *3-pr.*	4 (deck) 2 (sub.)	31	4000 / 1200 Oil	1433
b.	**Iron Duke** 1934 *Pl.* 4.	25,000	580	90	28	29,000 B. & W.	Portsm'th	Cammell Laird P.T.	1912	1914	2,080,918	12–8	1–2½	9–8	1–1½	10	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.* 2 *3-in.* A.A.	4	21 *t*	3250 / 1050 Oil	828
b.	**King George V.** 1925 *Pl.* 6.	23,000	555	89	27½	28,005 B. & W.	Portsm'th	Parsons P.T.	1911	1912	1,965,413*	12–6	..	9	..	10	..	10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.* 2 *3-in.* A.A.	3	22 *t*	3150 / 850	900
b.c.	**Lion** 1922 *Pl.* 11.	26,350	660	88½	28	75,685 Y²	Devonport	Vickers P.T.	1910	1912	2,086,458*	9	..	6	..	9	..	8 *13·5-in.*, 15 *4-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	2	28·5 *t*	3000	980

b.	**Malaya¶** 1936 *Pl.* 3.	27,500	600	$90\frac{1}{2}$	$28\frac{3}{4}$	75,000 B. & W.	Walker	Wallsend P. T.	1915	1916	¶	13–6	3–1	6	4–2	10	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	4	25	Oil 3400	925
b.	**Marlborough** 1934 *Pl.* 4.	25,000	580	90	28	29,000 Y^2	Devonport	Hawthorn P.T.	1912	1914	2,043,437	12–8	$1–2\frac{1}{2}$	9–8	$1–1\frac{1}{2}$	10	6	10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	4	21 *t*	3250 1050 Oil	828
b.	**Monarch** 1922 *Pl.* 6.	22,500	545	$88\frac{1}{2}$	$27\frac{1}{2}$	28,555 Y^2	Elswick	Hawthorn. P. T.	1911	1912	1,886,912*	12	..	9	..	10	..	10 *13·5-in.*, 14 *4-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	3	21·88 *t*	900 2700	800
b.c.	**New Zealand‡** 1922 *Pl.* 12.	18,800	555	80	$26\frac{1}{2}$	46,894 B. & W.	Govan	Fairfield P.T.	1911	1912	(‡)	..	..	..	..	..	..	8 *12-in.*, 10 *4-in.*, 4 *3-pr.*, 5 M., 1 *4-in.* A.A.	2	25	1000	780
b.	**Orion** 1922 *Pl.* 6.	22,500	545	$88\frac{1}{2}$	$27\frac{1}{2}$	29,108 B. & W.	Portsm'th	Wallsend P. T.	1910	1911	1,918,773*	12	..	9	..	10	..	10 *13·5-in.*, 13 *1 in.*, 4 *3-pr.*, 5 M., 1 *3-in.* A.A.	3	21·02 *t*	900 2700	800
b.c.	**Princess Royal** 1922 *Pl.* 11.	26,350	660	$88\frac{1}{2}$	28	76,510 Y^2	Barrow	Vickers P.T.	1911	1912	2,092,214*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	2	28·5 *t*	3000	980
b.	**Queen Elizabeth** 1935 *Pl.* 3.	27,500	600	$90\frac{1}{2}$	$28\frac{3}{4}$	75,000 B. & W.	Portsm'th	Wallsend P.T.	1913	1915	..	13–6	3–1	6	4–2	10	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	4	25	Oil 3400	925
b	**Ramillies** 1941	25,750	580	$88\frac{1}{2}$	$28\frac{1}{2}$	40,000 Y.	Dalmuir	Beardmore, P.T.	1916	1917	..	13–6	4–1	6	6–4	11	6	8 *15-in.*, 14 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	4	23	3420 Oil	915
b.	**Resolution** 1937 *Pl.* 2.						Jarrow	Palmer P.T.	1915	1916												
b.	**Revenge** 1937	25,750	580	$88\frac{1}{2}$	$28\frac{1}{2}$	40,009 Y.	Barrow	Vickers P.T.	1915	1916	..	13–6	4–1	6	6–4	11	6	8 *15-in.*, 14 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	4	23	3420 Oil.	915
b.	**Royal Oak** 1938						Devonp'rt	Hawthorn P.T.	1914	1916	2,468,269											
b.	**Royal Sovereign** 1936 *Pl.* 2.						Portsm'th	Parsons P.T.	1915	1916	2,570,929											
b.c.	**Renown** 1940	26,500	750	90	$25\frac{1}{2}$	112,000 B. & W.	Govan	Fairfield B.C.T.	1916	1916	3,111,284	6–3 K.C.	2	6–3	4–3	9–7 K.C.	6 K.C.	6 *15-in.*, 17 *4-in.*, 4 *3-pr.*, 2 *3-in.* A.A.	2	32	4250 Oil.	950
b.c.	**Repulse** 1939 *Pl.* 7.						Clydeb'nk	J. Brown B.C.T.	1916	1916	2,760,062											
b.	**Thunderer** 1925 *Pl.* 6.	22,500	545	$88\frac{1}{2}$	$27\frac{1}{2}$	27,604 B. & W.	Blackwall	Thames Ironworks P. T.	1911	1912	1,889,920*	12	..	9	..	10	..	10 *13·5-in.*, 14 *4-in.*, 4 *3-pr.*, 1 *3-in.* A.A., 5 M.	3	21	900 2700	800

* Total estimated cost of ship including guns.

‡ Built at the charge of the New Zealand Government.

¶ Built at the charge of the Federated Malay States.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME. DATE FOR SCRAPPING.	Displacement.	Length.	Beam.	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. Oil.	Complement.
		tons.	ft.	ft.	ft.						£.	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.c.	**Tiger** . . . 1935 *Pl.* 10.	28,500	660	$90\frac{1}{2}$	$28\frac{1}{2}$	108,000 B. & W.	Clydeb'nk	J. Brown . B. C. T.	1913	1914	2,500,000*	9–3	3–1	6	4–2	9	6	8 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	4	30	3320 900	1110
b.	**Valiant** . . . 1939 *Pl.* 3.	27,500	600	$90\frac{1}{2}$	$28\frac{3}{4}$	75,000 B. & W.	Govan .	Fairfield . B. C. T.	1914	1916	..	13–6	3–1	6	4–2	10	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	4	25	Oil 3400	925
b.	**Warspite** . . . 1935 *Pl.* 3.	27,500	600	$90\frac{1}{2}$	$28\frac{3}{4}$	75,000 B. & W.	Devonp'rt	Hawthorn P.T.	1913	1915	..	13–6	3–1	6	4–2	10	6	8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 5 M., 2 *3-in.* A.A.	4	25	Oil 3400	925
	Two capital ships (projected.)	Improved Hood design				—	To be built by contract.		—	—	—	—	—	—	—	—	—	16-*in.* guns.	—	—	—	—

* Total estimated cost of ship, including guns.

The dates placed under the names of ships indicate the years in which they are to be scrapped according to the Washington Treaty.
The following ship is in the non-effective category: Agamemnon, battleship, Fleet target service.

River Gunboats.

Two classes of river gunboats were added to the Navy during the war. The first class has a displacement of 640 tons, length 230 ft., beam 36 ft., draught 4 ft., H.P. 2000, speed 14 knots, armament, two 6-in., two 12-prs., six M.; fuel capacity, coal 35, oil 54 tons. Names:—Aphis, Bee, Cicala, Cockchafer, Cricket, Glowworm, Gnat, Ladybird, Mantis, Moth, Scarab and Tarantula. Particulars of the smaller class are:—Displacement 98 tons, length 120 ft., beam 20 ft., draught 2 ft., H.P. 175, speed 10 knots, armament, one 4-in., one 12-pr., one 2-pr. A.A.; fuel capacity, coal 5, oil, 10 tons. Names:—Gadfly, Grayfly, Sedgefly, and Blackfly. The Mayfly has been lent to the War Office since January, 1918. Older vessels of this class still remaining in commission are the Moorhen, Robin, Teal, Widgeon, Woodcock, and Woodlark.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
S.C.	Argus	14,450	565	68	22¾	20,000	Dalmuir	Beardmore T.	1917	1918	..	..	..	4 *4-in.* A.A., 2 *4-in.* Q.F. 15 M.	..	20¾	..	..
P. L. Cr.	Inconstant (s)	3500	410	39	14	40,000	Dalmuir	Beardmore P.T.	1914	1914	289,000*	3	..	3 *6-in.*, 4 *4-in.* Q.F., 2 *3-in.* A.A., 1 M.	4	30	840 Oil.	270
P. L. Cr.	Galatea (s)						Dalmuir	Beardmore P.T.	1914	1914								
P. L. Cr.	Penelope (s)						Barrow	Vickers P.T.	1914	1914								
P. L. Cr.	Phaeton (s)						Barrow	Vickers P.T.	1914	1915								
P. L. Cr.	Royalist (s)						Dalmuir	Beardmore P.T.	1915	1915								
P. L. Cr.	Undaunted (s)						Govan	Fairfield B.C.T.	1914	1914								
Cr.	Birmingham	5440	430	49·10	15·10	26,500	Elswick	Hawthorn. T.	1912	1914	353,437*	..	..	9 *6-in.*, 4 *3-pr.*, 1 *3-in.* A.A.	2	25·5	650	400
L. Cr.	Courageous	18,600	735	81	22·3	90,000 Y.	Walker (Armstr'g)	Parsons P.T.(G.)	1916	1916	..	3	9–7	4 *15-in.*, 18 *4-in.*, 2 *3-in.* A.A., 19 M.	2/12	32	Oil/3250	785
"	Glorious (a) *Pl. 8.*						Belfast	Harland & Wolff T.(G.)										
S. C.	Furious *Pl. 9.*	19,100	735	88	21·6	90,000	Walker (Armstrong)	Wallsend Engn'g Co. T.(G.)	1916	1917	1,920,000†	3	7	10 *5·5-in.*, 5 *3-in.* A.A., 2 *3-pr.*	2/16	31	Oil/3400	725

(a) To be converted into an aircraft-carrier. (s) Transferred to ineffective list; to be scrapped or sold.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. L. Cr.	Calliope .						Chath'm	Parsons . P.T. (G.)	1914	1915								
" "	Caroline .						Birken-head	Cammell Laird P.T.	1914	1914								
" "	Carysfort .						Pembroke	Hawthorn. B.C.T.	1914	1915								
" "	Champion	3750	420	41	13·6	40,000	Newcastle (Hawth'rn)	Hawthorn. P.T. (G.)	1914	1915	..	3	..	2 *6-in.*, 8 *4-in.*, 2 *3-in.*, A.A. ‡	4	29	Oil / 900	287
" "	Cleopatra .						Devonport	Cammell Laird P.T.	1914	1915								
" "	Comus .						Newcastle (Swan Hunter)	Wallsend Engn'g Co. P.T.	1914	1915								
" "	Conquest .						Chatham	Scotts' . P.T.	1914	1915								
" "	Cordelia . *Pl.* 16.						Pembroke	Hawthorn. P.T.	1914	1915	..	3	..	2 *6-in.*, 8 *4-in.*, 2 *3-in.*, A.A. ‡	4	29	Oil / 900	287
" "	Cairo .						Birken-head	Cammell Laird T.(G.)	1918	1919								
" "	Calcutta .						Barrow .	Vickers . T. (G.)	1918	1919								
" "	Cape Town	4190	425	43·6	14·6	40,000	Birken-head	Cammell Laird T.(G.)	1919	1922	..	3	..	5 *6-in.*, 2 *3-in.* A.A., 16 M.	8	29	Oil / 900	287
" "	Carlisle .						Govan .	Fairfield . T. (G.)	1918	1918								
" "	Colombo . *Pl.* 16.						Govan .	Fairfield . T. (G.)	1918	1919								
" "	Caledon .						Birken-head	Cammell Laird T.(G.)	1916									
" "	Calypso .	4120	425	42·9	14·6	40,000	Glasgow	Scotts' . T. (G.)	1917	1917	300,000	3	..	5 *6-in.*, 2 *3-in.* A.A., 16 M.	8	29	Oil / 900	287
" "	Caradoc . *Pl.* 16.						Barrow .	Vickers . T. (G.)	1916									

P. L. Cr.	Cambrian.	3750	420	41·6	14·6	40,000	Pembroke	T.	1915	1916	300,000†	3	..	4 6-*in.*, 2 3-*in.* A.A.	2	29	Oil / 900	287
" "	Canterbury						Clydebank	J. Brown T.	1915	1916								
" "	Castor						Birkenhead	Cammell Laird T.	1915	1915								
" "	Constance. *Pl.* 16.						Birkenhead	Cammell Laird T.	1915	1916								
" "	Cardiff	4190	425	43·6	14·6	40,000	Govan	Fairfield T. (G.)	1917	1917	..	3	..	5 6-*in.*, 2 3-*in.* A.A. 16 M.	8	29	Oil / 900	287
" "	Ceres						Clydebank	J. Brown T. (G.)	1917	1917								
" "	Coventry						Newcastle (Swan Hunter)	Swan Hunter T. (G.)	1917	1918								
" "	Curacoa						Pembroke	..	1917	1918								
" "	Curlew *Pl.* 16.						Barrow	Vickers T. (G.)	1917	1917								
" "	Centaur	3750	420	42	13·6	40,000	Elswick	Armstrong T.	1915	1916	300,000†	3	..	5 6-*in.*, 2 3-*in.*, A.A., 8 M.	2	29	Oil / 900	287
" "	Concord *Pl.* 16.						Elswick	Armstrong T.										
Cr	Dartmouth	5250	430	48½	15½	23,467 Y.	Barrow	Vickers P.T.	1911	1911	329,406*	2–¾	..	8 6-*in.*, 4 3-*pr.*, 4 M., 1 3-*in.* A.A.	2	25·9 *t*	1290 / 260	390
P. L. Cr.	Despatch	4750	445	46	14·3	40,000	Govan	Fairfield T. (G.)	1919	1922	..	3	Shields	6 6-*in.*, 2 4-*in.* A.A., 16 M.	12	29	Oil / 1050	340
" "	Diomede *Pl.* 15.						Barrow	Vickers T. (G.)	1919	1922								
" "	Danae	4750	445	46	14·3	40,000	Elswick	Armstrong T. (G.)	1918	1918	..	3	Shield	6 6-*in.*, 2 3-*in.* A.A., 16 M.	12	29	Oil / 1050	340
" "	Dauntless						Jarrow	Palmer T. (G.)	1918	1918								
" "	Dragon *Pl.* 15.						Green'ek	Scott T. (G.)	1917	1918								

* Total estimated cost of ship including guns. † Estimated cost as originally designed. ‡ Some of the vessels of this class have all 6-in. armament; and the anti-aircraft guns also vary.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Fuel. Coal. / Oil.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. L. Cr.	Delhi						Elswick	Armstrong T. (G.)	1918	1919								
" "	Dunedin	4750	445	46	14·3	40,000	Elswick	Armstrong T. (G.)	1918	1919	..	3	Shields	6 *6-in.*, 2 *3-in.* A.A. (Durban 2 *4-in.* A.A.), 16 M.	12	29	Oil / 1050	340
" "	Durban *Pl.* 15.						Green'ck	Scott T. (G.)	1919	1921								
Cr.	Dublin	5400	430	49·10	15¾	25,000 Y.	Dalmuir	Beardmore P. T.	1912	1913	337,565*	3 / –	..	8 *6-in.*, 1 *3-in.* A.A., 1 *12-pr.*, 14 M.	2	25·5	1240 / 260	400
S.C.	Eagle, *ex* Almirante Cochrane.	22,790	625	92	24	55,000	Walker	J. Brown	1918	..	3,310,042	..	..	12 *6-in.*, 4 *4-in.* A.A.	..	24	3200 / 1750	..
P. L. Cr.	Effingham						Portsmouth	Harland & Wolff. T.	1921	..								
" "	Frobisher	9750	565	65	17·3	60,000 / 70,000	Devonport	Wallsend Eng. Co. T.	1920	..	750,000†	3	Shields	7 *7·5-in.*, 4 *3-in.* A.A., 1 *12-pr.*, 12 M.	6	30	1500 / 800 Oil	480
" "	Hawkins *Pl.* 13.						Chatham	Parsons Co. T. (G.)	..	1919								
P. L. Cr.	Enterprise						Clydebank	John Brown T. (G.)	1919	..	..							
" "	Emerald	7550	545	54½	16½	80,000	Elswick	Armstrong T. (G.)	1920	..	..	3–1½ / 1	..	7 *6-in.*, 2 *4-in.* A.A., 7 M.	12	32·33	1600 / 650 Oil	556
S. C.	Hermes	10,400	548	70	18¾	40,000	Elswick	Parsons Co. T. (G.)	1919	..	..	..	..	10 *5·5-in.*, 4 *4-in.* A.A.	..	25	2000	630 §

Cr. . . .	**Lowestoft** .	5440	430	49	15	22,000	Chatham	Fairfield . T.	1913	1914	375,162	..	..	9 *6-in.*, 4 *3-pr.*, 1 *3-in.*, A.A.	2	25·5	650	..
S. C. . .	**Pegasus** . . (late Stockholm)	3070	..	..	..	9,500 *t*	..	T. (G.)	..	1917	..	..	..	4 *12-pr.* (2 A.A.), 15 M.	..	..	..	..
Minelayer .	**Princess Margaret** .	5440	395½	54	16½	15,000	Purchased 1919	..	..	1914	..	..	..	2 *4-in.*, 2 *3-in.* A.A.	..	22½	585	..
Cr. . . .	**Southampton** .	5400	430	49·10	15¾	25,000 Y.	Clydeb'nk	J. Brown . C.T.	1912	1913	336,469*	3 / —	..	8 *6-in.*, 1 *3-in.* A.A., 14 M.	2	25·5	1240 / 260	400
S. C. . .	**Vindictive** . *ex* Cavendish *Pl.* 14.	9750	565	65	20·4	60,000	Belfast	Harland & Wolff T. (G.)	..	1918	..	..	..	4 *7·5 in.*, 4 *3-in.*, Q.F., 4 *3-in.* A.A., 1 *12-pr.*, 13 M.	6	28·75	800 1420	..
,, . . .	**Weymouth**	5250	430	48½	15½	22,000 Y.	Elswick	Parsons . P. T.	1910	1911	337,738*	2¾	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 *3-in.* A.A.	2	25·5 *t*	1290 / 260	390
,, . . .	**Yarmouth**						Glasgow	London & Glas. Co. C. T.	1911	1912	353,238*							

* Total estimated cost of ship, including guns. † Estimated cost as originally designed. § 500 Naval ratings, and 130 R.A.F. Personnel.

There are a number of other vessels on the non-effective list which are being used for various purposes as repair ships, and other auxiliary work, including depôt ships for destroyers and submarines.

Defence Forces of the Dominions.

ROYAL AUSTRALIAN NAVY.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
b.c.	Australia (a) *Pl.* 12.	18,800	555	80	26½	48,000	Clyde-bank	J. Brown P.T.	1911	1913	..	..	..	8 *12-in.*, 12 *4-in.*, 2 *4-in.* A.A., 4 *3-pr.*, 5 M.	2	26·0 *t*	1000	790
Ⲣ. L. Cr.	Adelaide	5560	430	49½	15¾	25,000	Sydney	T.	1918	..	..	..	..	9 *6-in.*, 1 *12-pr.*, 5 M. 1 *3-in.* A.A.	2	26	..	..
„ „	Melbourne						Birken-head	Cammell Laird. T.	1912	1913								
„ „	Sydney	5400	430	49½	15¾	25,000	Glasgow	London & Glasgow Co. T.	1912	1913	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 *3-in.* A A.	2	25·5	..	..
„ „	Brisbane						Sydney	T.	1915	1916								
„ „	Encounter	5880	355	56	20¼	12,500 Dürr	Devonp'rt	Devonport Dockyard	1903	1906	370,275	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·75	600	454
Flot. Ldr.	Anzac	1660	315	31·9	10	36,000	Dumbar-ton	Denny	1916	1917	..	..	..	4 *4-in.* Q.F., 7 M.	2	34	515 Oil	..

(a) To be scrapped, 1922, under Washington Treaty.

DESTROYERS.—"*River*" *Class*:—Huon, Parramatta, Swan, Torrens, Warrego, Yarra. Launched, 1910–15; Displacement, 700 tons; 9,500–11,300 H.P.; speed, 27 knots; armament, one 4-in., three 12-pdrs., three tubes.

"*S*" *Class*:—Stalwart, Success, Swordsman, Tasmania, Tattoo. Launched, 1918–19; Displacement, 1,250 tons; 27,00 H.P.; speed, 36 knots; armament, three 4-in., one 2-pdr., 6 tubes (4 21-in., 2 18-in.).

SUBMARINES.—"*J*" *Class*:—J 1, J 2, J 3, J 4, J 5, J 7. Launched, 1916–18; Displacement, surface, 1,210 tons, submerged, 1,820 tons; H.P., surface, 3,600, submerged, 1,350; speed, surface, 19 knots, submerged, 9½ knots; oil fuel, 91 tons; armament, one 3-in. or 4-in., six 18-in. tubes.

SLOOPS.—"*Flower*" *Class*:—Mallow, Marguerite, Geranium. Launched, 1915: Displacement, 1,250 tons; 2,000 H.P.: speed, 17 knots; armament, one 4·7-in., two 3-pr. A.A.

The Royal Australian Navy also includes the Cerberus, gunboat; Platypus, submarine depôt ship; Pioneer, light cruiser, and several old cruisers and sloops which were lent for service during the war, as well as certain armed patrol vessels taken up for the same purpose.

NEW ZEALAND NAVY.

LIGHT CRUISER.—"*City*" *Class*:—Chatham. Completed, 1912 (Chatham Dockyard and Thames Ironworks). Displacement, 5,400 tons; 25,000 H.P.; speed, 25½ knots; armament, eight 6-in., four 3-pr., one 3-in. A.A., four M., two 21-in. tubes; max. coal, 1,240 tons; oil, 260 tons; complement, 400.

EX-LIGHT CRUISER.—"*Pearl*" *Class*:—Philomel. (Training and Depôt-ship, Auckland). Completed, 1892 (Devonport and Earle). Displacement, 2,575 tons; 7,500 H.P.; speed 19 knots; armament, one 6-in., one 4-in., two 12-pr.; coal, 300 tons; original complement, 217.

NEWFOUNDLAND.

SLOOP.—"*Flower*" *Class*:—Lobelia. Completed 1916 (Simons). Displacement, 1,250 tons; 2,000 H.P.; speed, 17 knots; armament, one 4·7-in., two 3-pr. A.A.

ROYAL CANADIAN NAVY.

LIGHT CRUISER.—"*Arethusa*" *Class*:—Aurora. Completed, 1914 (Devonport Dockyard and Parsons Co.). Displacement, 3,500 tons; 40,000 H.P.; speed, 30 knots; armament, two 6-in., six 4-in. Q.F., one 4-in. A.A., one M., four 21-in. tubes; oil, 840 tons; complement, 270.

DESTROYERS.—"*M*" *Class*:—Patrician and Patriot. Completed, 1916 (Thornycroft). Displacement, 980 tons; 26,500 H.P.; speed, 35 knots; armament, three 4-in., two 1½-pdrs., four 21-in. tubes; oil, 256 tons (radius of action, 1,510 at 15 knots).

SUBMARINES.—"*H*" *Class*:—H 4, H 15. Surface displacement, 440 tons, submerged, 500; surface H.P., 480, submerged, 320; surface speed, 13 knots, submerged, 10½ knots; oil fuel, 16 tons; armament, four 21-in. tubes.

The Royal Canadian Navy has no effective ships of the larger classes, the cruisers Niobe and Rainbow, which were lent for training purposes, being ordered in March, 1920, to be paid off for sale.

SOUTH AFRICA.

SURVEYING SHIP.—"*Beaufort*" *Class*:—Crozier. Twin-screw mine-sweeper, converted 1919. Displacement, 800 tons; 2,200 H.P.; speed, 16 knots; coal capacity, 181–185 tons; armament, one 3-pr. Transferred to South Africa, September, 1921.

TRAWLERS.—*Admiralty Type*:—Eden and Foyle. Armament, one 12-pr. Transferred to South Africa, September, 1921, for mine-sweeping instructional duties.

ARGENTINE REPUBLIC.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Garibaldi . .	6840	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	2	19·9 *t*	1000	500
a.c.	General Belgrano .	7069	328	59¾	24	13,000	Leghorn .	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 4 *2·2-in.*, 2 L., 2 M.	..	20·1 *t*	1000	500
a.c.	General San Martin	6773	328	59¾	24	13,000	Leghorn .	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 L., 2 M.	4	19·8	1100	500
b.	Moreno . . / Rivadavia . *Pl.* 17.	27600	585	98	27½	39,500 B. & W. Curtis t.	Camden, N.J. (N.Y.S.B.Co.) / Quincy, Mass.	1911	1914	2,200,000	12–10 K.S.	3–2	9–6 K.S.	9 K.S.	12–9 K.S.	6 K.S.	12 *12-in.*, 12 *6-in.*, 14 *4-in.*, 10 smaller.	2 sub.	22·5 *t*	1600 / 4000	1046
a.c.	Pueyrredon . .	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	..	20·1 *t*	1000	500

The old coast-defence ironclads Libertad and Independencia, 2336 tons, completed at Birkenhead in 1892–93, carry two 9·4-in., four 4·7-in., and four 3-pr. guns.

Cruiser Buenos Aires (Elswick, 1895), 4780 tons, two 8-in., four 6-in., six 4·7 in., three T.T., 23·2 knots on trial; river gunboats Patria (1894), 1070 tons, two 4·7 in., eight smaller, five T.T., Paraná and Rosario (Elswick, 1909), 1000 tons, two 6-in. howitzers, six 12-pr., twelve smaller, 15 knots. For destroyers, see Flotilla Tables.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons; also the old cruiser Nueve de Julio, 3570 tons, Elswick 1902, and several small gunboats and torpedo-gunboats. There are 14 transports and many auxiliaries and 18 additional have recently been acquired in Europe.

The programme for a considerable reorganisation and the augmentation of the resources of the Navy is in abeyance.

BRAZIL.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in			knots.	tons.	
c.d.s., t.	**Marshal Deodoro**	3112	267½	48	13¼	3400 D'A.	La Seyne	1898	1900	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236	200
c.d.s., t.	**Marshal Floriano**							1899	1901												
b.	**Minas Geraes** . *Pl. 18.*	19,281	500	83	25	27,212 *t* B.&W.	Elswick	. 1908	1909	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·4 *t*	900 2400	900
b.	**São Paulo** . *Pl. 18.*	19,281	500	83	25	28,645 *t* B.&W.	Barrow	. 1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9 K.S.	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·6 *t*	900 2400	900

The Minas Geraes has been refitted at the Brooklyn Navy Yard, where the São Paulo is in hand for the same purpose.

Light Cruisers:—Bahia and Rio Grande do Sul, completed at Elswick, 1910, 3100 tons, ten 4·7-in., eight 1·8-in. guns, 17,000 H.P., 27 knots; Barroso (Elswick, 1897), 3600 tons, six 6-in., four 4·7-in. guns, 20 knots; also Republica. Four 12-knot river gunboats, Missões, Acre and two others (Poplar, 1907). Carlos Gomes, mine-layer. Torpedo-gunboat Tymbira. Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro.

CHILE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b	Almirante Latorre (ex Canada) *Pl.* 19.	28,000	625	92	28½	37,000 Y 2	Elswick	1913	1915	..	9–4 A.I.	4–2½	4½	..	10	6	10 *14-in.*, 14 *6-in.*, 6 *3-in.* and M.	4 sub.	23	3300 / 520	1000
s.c.	O'Higgins	8,500	411¾	62½	22	16,000 B.	Elswick	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 *t*	1260	500
b.	Capitan Prat	5,981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 10 *12-pr.*, 14 smaller and M.	4	18·3 *t*	775	480
a.c.	Esmeralda	7,020	436	53¼	22¼	16,000	Elswick	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3	22·8 *t*	1350	500

Capitan Prat reconstructed.

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
cr.	Blanco Encalada	4400	370	46½	18½	14,500	Elswick	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 *t*	900	427
,,	Chacabuco	4500	360	46	18	15,750	Elswick	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000	350
,,	General Baquedano (Training)	2330	240	45¾	18	1500 B.	Elswick	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 *t.*	300	302
,,	Ministro Zenteno	3600	330¼	43¾	16¾	6500	Elswick	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.**	3	20·0*t*	800	280
,,	Presidente Errázuriz (Training)	2047	268	35¾	19½	5400	La Seyne	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong.

Transports: Maipo, 11,000 tons; Rancagua, 10,000 tons; Angamos, 5,000 tons; Aguila, 600 tons; Porvenir, 300 tons. Sloops or patrol vessels: Orompello, Leucoton, Elicura, Colocolo, 500 tons; Yanez, Yelcho, Huemul, Condor, 100 to 250 tons.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Fuel.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	**Herluf Trolle** .	3595	271	50	16¼	4400 T.	Copenhagen	1899	1901	..	7–4 H.S.	3	..	..	7 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 6 *12-pr.*, 2 *6-pr.*	3 (sub.)	16·5	250	250
c.d.s.,t.	**Niels Juel** .	4100	295	53½	15¾	5500	Copenhagen	1918	1923	..	8–4 K.S.	2	..	7	..	2 K.S.	10 *5·9-in.*, 3 *6-pr.*	2 (sub.)	17	250 Oil	250
c.d.s.,t.	**Olfert Fischer** .	3650	271	50	16¼	4600	Copenhagen	1903	1905	..	7–4 K.S.	3	..	..	7 K.S.	6	2 *9·4-in.*, 4 *5·9-in.*, 6 *12-pr.*, 2 *6-pr.*	3 (sub.)	16·0	250	250
c.d.s.,t.	**Peder Skram** .	3735	274½	51½	16¼	5400	Copenhagen	1908	1909	..	8–4 K.S	2	..	..	7 K.S.	6 K.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *14-pr.*, 2 *1-pr.*	4	16·0	250	250
c.d.s.,t.	**Skjold** . .	2200	226½	38	13½	2400 T.	Copenhagen	1896	1899	..	10–3 H.S.	2	..	7	8	5½	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *6-pr.*	4	13·0	280	210

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.				tons.	
3rd cl. *cr.*	**Geiser** . . .	1280	232	34	11¼	3600 T.	Copenhagen .	1892	1893 1907	..	1½	..	2 *4·7-in.*, 4 *20-pr.*, 4 *6-pr.*	2	17·1 *t*	150	155
,,	**Heimdal** . .	1313	232	34	11¾	3100 T.	Copenhagen .	1894	1896	..	1½	..	2 *4·7-in.*, 4 *20-pr.*, 4 *6-pr.*, 6 M.	2	17·5	150	155

Heimdal, used as cadets' training ship. Valkyrien (3020 tons), reconstructed 1913, training ship. Mine-layers Lossen, Hjælperen, Beskytteren, Minekran 1-6, Mining boats 1–10. Torpedo transport Slejpner. Fylla (ex-British sloop Asphodel), and 4 other fishery inspection cruisers. Groensund, submarine repair ship, Hekla submarine depôt. Three surveying ships.

Z

FRANCE.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.‡	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Bretagne . . 1934 *Pl.* 20.	23,177	546	88½	29	29,000 N. tur.	Brest .	1913	1915	2,589,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 8 small Q.F. and M.	4 (sub.)	20·0	900 2700	1167
a.c.	Condé * . .	10,397	453	63¾	24½	22,175 Nic.	Lorient .	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 20 *1·8-in.*	..	21·4 *t*	970 1590	615
b.	Condorcet. .	18,890	481	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,165,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·8 *t*	960 2010	690
b.	Courbet . . 1930 *Pl.* 21.	23,100	546	88½	29	28,000 N. tur.	Lorient .	1911	1913	2,508,388	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.* 4 L.	4 (sub.)	20·0	900 2700	998
b.	Diderot . .	18,863	476	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·75 *t*	960 2010	690
a.c.	Edgar Quinet .	14,100	521	70¼	27½	39,803 *t* B.	Brest .	1907	1911	1,307,536	6½–3½ K.S.	2½–1¼	5–2 K.S.	4¾ K.S.	8 K.S.	4¾ K.S.	14 *7·6-in.*, 20 *2·4-in.*, 4 smaller.	2 (sub.)	23·9 *t*	1242 2300	738
a.c.	Ernest Renan . *Pl.* 22.	13,427	515	70½	26¾	37,500 Nic., *t*	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5–3 H.S.	4¾	6 H.S.	5 H.S.	4 *7·6-in.*, 12 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	25·5 *t*	1354 2300	674
b.	France † . . *Pl.* 21.	23,100	546	88½	29	28,000 N. tur.	St. Nazaire	1912	1914	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.* Q.F. and M.	4 (sub.)	20·0	900 2700	998
a.c.	Gueydon * .	9,367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	2 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 6 *6·4-in.*, 6 *3-pr.*	..	21	1020 1600	610

† France lost by striking a rock at Quiberon Bay, August 25, 1922.

‡ In the case of the battleships Condorcet, Diderot, and Voltaire, the date of scrapping has not been indicated.

b.	**Jean Bart** 1930 *Pl.* 21.	23,467	546	88½	29	28,000 B. tur.	Brest	1911	1913	2,528,888	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*	4 (sub.)	22·0	900 / 2700	998
a.c.	**Jules Ferry** *Pl.* 22.	12,351	487	70¼	27	30,500 Guyot	Cherbourg	1903	1906	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	22·8 *t*	1320 / 2100	728
a.c.	**Jules Michelet** *Pl.* 22.	13,370	489½	70¼	27	27,700 Guyot	Lorient	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 2 *9-pr.*	2 (sub.)	23·2 *t*	1320 / 2100	724
b.	**Lorraine** 1936 *Pl.* 20.	23,549	546	88½	29	29,000 tur. S. & cyl.	St. Nazaire	1913	1916	2,642,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 4 *3-pr.*, 2 *1-pr.*	4 (sub.)	20·0	900 / 2700	1167
a.c.	**Marseillaise** *	9611	460	66	25½	21,500 B.	Brest	1900	1903	881,270	6·4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 20 *1·8-in.*	..	21·0	970 / 1590	615
a.c.	**Montcalm** *	9367	459	63¾	24½	19,600 N.S.	La Seyne	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 22 1.	..	21·0	1020 / 1600	612
b.	**Paris** 1934 *Pl.* 21.	23,467	546	88½	29	28,000 N. tur.	La Seyne	1912	1914	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*, Q. F. & M.	4 (sub.)	20·0	900 / 2700	998
b.	**Provence** 1935 *Pl.* 20.	23,177	546	88½	29	29,000 tur.	Lorient	1913	1915	2,589,000	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 18 *5·5-in.*, 8 l. and M.	4 (sub.)	20·0	900 / 2700	1167
a.c.	**Victor Hugo** *Pl.* 22.	13,108	480½	70¼	27	28,486 *t.* B.	Lorient	1904	1907	1,229,932	6¾–4 H.S.	2	5-3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	22·5 *t*	1320 / 2100	728
b.	**Voltaire**	18,754	481	84	27	22,500 B. tur.	La Seyne	1909	1911	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.* 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	20·66 *t*	960 / 2010	690
a.c.	**Waldeck-Rousseau**	14,220	515	70¼	27½	35,286 Nic. *t.*	Lorient	1908	1911	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 20 *2·4-in.*, 3 *3-pr.*, 2 *1-pr.*	2 (sub.)	23·10 *t*	1242 / 2300	738

* The armoured cruisers Condé, Gueydon, Marseillaise, and Montcalm are retained temporarily in the list. They are now employed in auxiliary duties. Patrie, 15,141 tons; Jeanne d'Arc, 11,300 tons; Pothuau, 5374 tons, training ships.

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l. cr.	**Colmar** (*ex*-Kolberg).	4280	402	46	16½	30,000 *t* (tur.)	Danzig (Schichau)	1908	1910	380,870	..	2	6 5·9-*in.*, 4 3·4-*in.* (Rearmed 1916).	2 (sub.)	26·3 *t*	890	379
”	**Metz** (*ex*-Königsberg)	4200	450†	45	16	45,000	Bremen(Weser)	1915	1916	—	1–2½	1	7 5·9-*in.*, 3 3·4-*in.* A.A., 2 M.	4 (sub.)	28·5	1400	500
”	**Mulhouse** (*ex* Stralsund)	4480	446¼†	43½	15¾	35,515 *t* (tur.)	Bremen(Weser)	1912	1913	416,340	1–2½	2	7 5·9-*in.*, 2 3·4-*in.* A.A., 2 M. (Rearmed)	2 (sub.)	28·27 *t*	1200	373
”	**Strasbourg** *Pl. 27.* (*ex*-Regensburg)	4842	456†	45	17	26,000 (P. tur.)	Bremen(Weser)	1914	1915	417,810	1–2½	2	7 5·9-*in.*, 2 3·4-*in.* A.A., 2 M. (Rearmed)	2 (sub.)	27·5	1279	373
”	**Thionville** (*ex*-Novara)	3500	416¾	42	15½	25,000 (tur.)	Fiume	1913	1914	..	1	..	9 3·9-*in.*, 4 smaller	1	27·0	450 850	320

† Water-line.

In addition is the *ex*-German flotilla leader S 113, now named the Admiral Sénès, in honour of the officer who went down with his flag flying in the Léon Gambetta, when she was torpedoed in 1915. The surrendered German airship L72 received the name of Dixmude.

During the war and subsequently the following despatch and gun vessels (350-700 tons, 17-22 knots) have been built: Algol. Altaïr, Aldebaran, Antarès, Bellatrix, Cassiopée, Régulus, Quentin-Roosevelt, Dubordieu, Dumont d'Urville, Du Couedic, Du Chaffault, Duperré, Ancre, Ailette, Arras, Bapaume, Escaut, Marne, Oise, Somme, Coucy, Nancy, Amiens, Aisne, Epernay, Lunéville, Péronne, Mondement, Montmirail, Reims, Verdun, Belfort, Epinal, Vauquois, Vimy, Vitry-le-François, Les Eparges, Lassigny, Remiremont, Revigny, Calais, Craonne, Liévin, Baccarat, Béthune, Scarpe, Suippe, Yser, Tahure, Dunkerque, Toul, Ville d'Ys, Meuse, and Chamois. In this series the vessels bearing the names of stars carry two 5·5-in. and two 6-prs.: the gunboats named after old seamen one 5·5-in. and one 3·9-in.; those named in honour of towns famed in the war two 5·5-in. one 12-pr. and 4 M.; and those bearing the names of rivers known in the war four 3·9-in. and five smaller. In the list are 26 other gun-vessels. In addition are the older cruisers D'Estrées, 2460 tons, and Cassard, 3890 tons, over 20 years of age, and several gun-vessels and 5 river gunboats. Submarine chasers fifty-four (internal combustion engines), fifteen (coal). Foudre, 5984 tons, repair ship. The ex-battleship Béarn is being converted into an aircraft carrier.

Twenty-four mine-trawlers of the Belliqueuse type, and a large flotilla of mine-trawlers.

Merchant Auxiliary Cruisers.—La France, 22,500 register tons, 23·5 knots, Touraine, 8429 register tons, 19·5 knots, Lorraine, 11,869 register tons, 21 knots, Savoie, 11,200 register tons, 22½ knots, of the Compagnie Générale Transatlantique, and some other vessels; also the Amazone, Magellan, Tonkin, and other 17 and 17½ knot boats of the Messageries Maritimes, and the Burdigala, 18 knots, and Lutetia, 20·5 knots, of the Sud Atlantique line.

GERMANY.

In the following list the letter **A** implies that the ships so marked are to be retained in reserve with their armament, but to have no ammunition or stores on board. They are being used mainly for barrack purposes.

Class.		NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns. The 12-prs. are field guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	.	**Braunschweig** .	12,997	398½	73½	24½	16,000 T.S. & C.	Germania .	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 2 *12-pr.*	5 (sub.)	18·0	700 / 1600	743
.	.	**Elsass** . . .	12,997	398½	72¾	24½	16,812 W.T.& C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 2 *12-pr.*	5 (sub.)	18·7	800 / 1600	743
b.	.	**Hannover** . .	13,040	398½	73¾	25¼	22,492 T.S. *t.*	Wilhelms-haven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *5·9-in.*, 20 *3·4-in.*, 2 *12-pr.*, 4 M.	5 (sub.)	19·16 *t*	700 / 1800	743
b.	.	**Hessen** . . .	12,997	398½	73¾	24½	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 2 *12-pr.*	5 (sub.)	18·0	800 / 1600	743
b.	A	**Lothringen** . .	12,997	398½	73¾	24½	16,950 W.T.&C.	Schichau (Danzig)	1904	1906	1,157,500	9–4 K. S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 M., 2 *12-pr.*	5 (sub.)	18·54 *t*	800 / 1600	743
b.	A	**Preussen** . . .	12,997	398½	73¾	24½	18,374 W.T.& C.	Stettin .	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*. 12 *1 4-in.* & 8 M., 2 *12 pr.*	5 (sub.)	18·6 *t*	1574 / 1600	743
b. / b.	. / .	**Schlesien** . / **Schleswig-Holstein**	13,040	398½	72¾	25¼	16,939 T.S. & C.	Schichau / Germania	1906	1908	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	11–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *5·9-in.*, 20 *3·4-in.*, 2 *12-pr.*, 4 M.	5 (sub.)	19·2 / 19·5 / *t*	700 / 1800	743

Light cruisers Medusa, Thetis, and Amazone (2630 tons), completed 1901; Arkona, 1903; Hamburg, 1904; Berlin, 1905, all mounting ten *4·1-in.* guns. Also the Nymphe and Niobe (1899, 1901), these two to retain armament, but to have no ammunition on board. The light cruiser to be built at Wilhelmshaven, to replace an older vessel, will be of the Dresden class, 5600 tons, length 508 ft. 6 ins., beam 46 ft. 9 ins., draught 16 ft. 4 ins., 29,000 h.-p., 8 *6-in.*, 3 *22-pr.*, 4 T.T.

Destroyers: S., 23; S., 18; G., 11, 10, 8, 7; V. 6, 5, 3, 2, 1; T. 196. In reserve (to retain armament), S. 19; T. 190, 185, 175.

Torpedo-boats: T. 168, 158, 157, 156, 154, 153, 151, 149, 146, 143, 141, 139. In reserve (to retain armament) T. 152, 148, 144, 135.

Surveying vessels Meteor and Panther.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a c.	Giorgios Averoff *Pl.* 23.	9956	429¾	68¾	24¾	20,000 B	Leghorn (Orlando)	1910	1911	1,100,000	8–3½ K.S.	1¾	7	7	8–6½	7	4 *9·2-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	24·0	700 1600	..
b.	Kilkis (*ex* Mississippi)	13,000	375	77	24¾	13,607 B.&W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3½–1 K.S.	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 14 smaller	2 (sub.)	17·1 *t.*	600 1750	725
b.	Lemnos (*ex* Idaho) *Pl.* 23.																				

The old battleships Hydra, Psara, and Spetsai are used in the training service.

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Elle (*ex* Fei-Hung)	2600	330	42	13	6500 tur.	Camden, N.J.	1912	1914	240,000	¾	..	2 *6-in.*, 4 *4-in.*, 4 *6-pr.*, 1 A.A.	2	22·5	..	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed. Mine-layers Aigialla, Monemvassia, Nauplia, Myconos. Five old gunboats and four corvettes. Three ex-British motor launches.

ITALY.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.*	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Andrea Doria 1937	22,562	575¾	92	29	32,000 P. tur. Y.	Spezia	1913	1915	..	10½–6 K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 16 *6-in.*, 14 *14-pr.*, 6 *14-pr.* A.A., 4 l. & M.	3 (sub.)	23	1000 2500	1074
b.	Caio Duilio 1936 *Pl.* 24.						Castellammare	1913	1915												
b.	Conte di Cavour 1936 *Pl.* 25.	22,023	557	92	29	24,000 Parsons B. & W.	Spezia	1911	1915	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*, 6 l. & M.	3 (sub.)	22·0	1000	999
b.	Dante Alighieri 1931 *Pl.* 25.	19,400	505	85	27¼	35,000*t* Parsons Bl.	Castellammare	1910	1912	..	9½–4½ K.S.	1½	6 K.S.	..	10 K.S.	..	12 *12-in.*, 20 *4·7-in.*, 14 *12-pr.*, 6 l.	3 (2 sub.)	23·8 *t*	1000 2500	900
b.	Giulio Cesare 1935	22,023	557	92	28	34,000 P. B.&W.	Genoa (Ansaldo)	1911	1914	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*, 6 l. & M.	3 (sub.)	23·0 *t*	1000	999
b.	Leonardo da Vinci 1933 *Pl.* 25.					P. Bl.	Genoa (Odero)	1911	1914												
b.	Napoli	12,425	435½	73½	27¼	20,000 B.&W.	Castellammare	1905	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711
	Regina Elena					20,000 B.	Spezia	1904	1907												
a.c.	Pisa *Pl.* 26.	9956	429¾	68¾	24¾	18,000 B.	Leghorn (Orlando)	1907	1908	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 l. & M.	3 (sub.)	23·0	700 1600	687
b.	Roma	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1907	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711
a.c.	San Giorgio	9832	429¾	68¾	24¾	18000 Bl.	Castellammare	1908	1910	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 4 l. & M.	3 (sub.)	22·5	700 1600	613
a.c.	San Marco *Pl.* 26.					18000 tur.															
b.	Vittorio Emanuele III	12,425	435½	73½	27¼	20,000 B.	Castellammare	1904	1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711

For the ships removed from the list, see Ch. II. The old armoured cruisers Francesco Ferruccio and Varese have been removed from the fighting list, being now employed for the training of cadets. Monitor Faa di Bruno and armed pontoons Carso, Cucco, and Vodice, 1,650 tons, 2 *15-in.*, 4 *14-pr.*, and 6 light guns. There are also some small monitors of the Monte Cengio class, 575 tons, one *15-in.*, one machine-gun.

* In the case of the older battleships the date of scrapping has not been indicated.

ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l. cr.	**Ancona** (*ex* German Graudenz) *Pl.* 27.	4842	456	45	17	27,400	Kiel	1913	1914	..	..	..	7 *5·9-in.*, 2 *22-pr.* 2 M.	2 *19·7 in.*	27·5	1279	..
Scout	**Aquila**	1460	310	31	10½	39,800	Naples (Pattison)	1915	1916	..	..	..	3 *6-in.*, 4 *12-pr.* A.A., carries 100 mines	4	35·0	350 Oil	160
”	**Augusto Reboty**	1800	331	31·3	10½	43,100	Genoa (Ansaldo)	1915	1916	..	..	..	8 *4-in.*, 2 *12-pr.* A.A.; carries 100 mines	4	35·0	350 Oil	160
l.c.	**Bari** (*ex*-German Pillau)	4320	441†	46	19½	27,400 turb.	Danzig (Schichau)	1914	1914	..	..	1	8 *5·9-in.*, 2 *3·4-in.* A.A. (Rearmed)	5	27·5	1000	..
”	**Brindisi** (*ex*-Austrian Helgoland)	3500	416¾	42	15½	25,000 Tur.	Fiume	1912	1914	..	1	..	9 *3·9-in.*, 4 smaller	2	27·0	450 850	320
Scout	**Carlo Mirabello**	1800	331	31·3	10½	43,100	Genoa (Ansaldo)	1914	1916	..	..	..	8 *4-in.*, 2 *12-pr.* A.A.; carries 100 mines	4	35·0	350 Oil	160
Scout	**Falco**	1460	310	31	10½	38,100	Naples (Pattison)	1917	1918	..	..	..	3 *6-in.*, 4 *12-pr.* A.A.; carries 120 mines	2 dbl.	35·0	200	160
”	**Leone**	2158	359	33½	11¼	42,000 turb.	Genoa (Ansaldo)	Bldg.	..	..	..	..	8 *4 7-in.*, 2 *14-pr.* A.A., 2 M.; mining equipment	6	34·0	200 400	..
l. cr.	**Libia**	3690	341½	47	16	12,500	Genoa (Ansaldo)	1912	1913	..	1½	..	2 *6 in.*, 8 *4·7-in.*, 14 smaller	2	22·0	630	300
Scout	**Marsala**	3400	460½	42¾	13¼	22,500 P.tur.Bl.	Castellammare	1912	1914	..	1½	..	6 *4·7-in.* and 6 *12-pr.*; mining equipment	2	28·0	800	240

† Water line.

Scout .	**Nino Bixio** . .	3400	460¼	42¾	13¼	22,500 Bl.Cur.t.	Castellammare .	1911	1914	..	1½	..	6 *4·7-in.* and 6 *12-pr.*, mining equipment	2	27·7	800	300
„	**Pantera** . . .	2158	359½	33½	11¼	42,000 turb.	Genoa (Ansaldo) .	Bldg.	..	..	..	..	8 *4·7-in.*, 2 *14-pr.* A.A., 2 M., mining equipment	6	32·0	400 / 200	100
„ .	**Premuda** . . (*ex* German V. 116)	2500	360	36	14	4500 approx.	Hamburg . .	1918	1919	..	..	..	4 *5·9-in.*	4 *23·6 in.*	35	600 Oil	..
„ .	**Quarto** . . .	3220	432	43¾	13¾	29,000 P.tur.Bl.	Venice . . .	1911	1912	..	1½	..	6 *4·7-in.* and 6 *12-pr.*, mining equipment	2	28·6	450	240
l.c. .	**Taranto** (*ex*-German Strassburg)	4480	446¼†	43½	15¾	33,742 *t* P. tur.	Wilhelmshaven .	1912	1912	416,340	4–2½	2	7 *5·9-in.*, 2 *3·4-in.* A.A., 2 M. (Rearmed)	2 (sub.)	28·28 *t*	1200	373
Scout .	**Tigre** . . .	2158	359½	33½	11¼	42,000 turb.	Genoa (Ansaldo) .	Bldg.	..	..	..	8	8 *4·7-in.*, 2 *14-pr.* A.A., 2 M., mining equipment	6	34·0	200 / 400	..
l.c. .	**Venezia** (*ex*-Austrian Saida)	3500	416¾	42	15½	25,000 Tur.	Monfalcone . .	1912	1914	..	1	..	9 *3·9-in.*, 4 smaller . .	2	27·0	450 / 850	320

The scouts have been built to act also as flotilla leaders.

Etna (3474 tons), converted into a training ship. Agordat, mining vessel. Coal and liquid fuel transport Bronte (9490 tons); also Tevere, Prometeo, Cocito, and Lete. An oil transport with under-water protection, the Brennero, has been completed. Anteo, submarine salvage vessel. Lagoon and river gunboats and mine-layers, Confida, Castore, Brondolo, and Marghera, 1900 tons, 17 knots. Gunboats Giuliana, Archimede, Galileo (Mediterranean); M. Toselli, Misurata, Gen. Arimondi (East Indies); S. Caboto, E. Carlotto (China). Light cruiser Campania. Surveying vessel, Ammiraglio Magnaghi, 1800 tons, 14 knots. Small vessels, Capitano Verri (*ex*-Thetis) and Bengazi (*ex*-Derna) captured from the Turks. About 50 various patrolling vessels, 10 gunboats, and the Puglia and other mine layers. During the war a great number of motor chasers (M.A.S.) were bought and built, and at the beginning of 1921 about 350 of these were still on the list.

† Water line.

JAPAN.—Armoured Ships.

Class.	NAME. DATE FOR SCRAPPING.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.†
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
b.c.	**Akagi** *	40,000	850	100	..	..	Kure	Bldg.	..	..	..	..	..	..	..	..	8 *16-in.*, 20 5 *5-in.* ..	8	33	..	..
„	**Amagi** *						Yokosuka														
b.	**Aki** ‖ 1922 *Pl.* 30.	19,800	460	$83\frac{1}{2}$	$27\frac{1}{2}$	24,000 My. tur.	Kure	1907	1910	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 8 *6-in.*, 8 *12-pr*, 8 l. and M.	5 (sub.)	20·5	..	937
b.	**Fuso** 1937 *Pl.* 29.	30,600	630	94	$28\frac{1}{2}$	40,000 tur.	Kure	1914	1915	..	12 K.S.	3	6 K.S.	..	12 K.S.	6 K.S.	12 *14-in.*, 16 *6-in.*, 4 *12-pr.* A.A.	6 (sub.)	23	1500 / 4000	1193
b.	**Hyuga** 1940	31,260	640	94	$28\frac{1}{2}$	45,000 tur.	Nagasaki (Mitsubishi)	1917	1918								12 *14-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A.	6 (sub.)	23	1500 / 4000	1360
b.c.	**Haruna** 1935	27,500	$653\frac{1}{2}$	92	$27\frac{1}{2}$	64,000 My. P. t. My. C. t.	Kobe (Kawasaki)	1913	1915	..	8–6 K.S.	$2\frac{3}{4}$	..	..	10 K.S.	7 K.S.	8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A.	8 (sub.)	27·5	1000 / 4000	980
„	**Hiyei** 1935 *Pl.* 32.						Yokosuka	1912	1914												
b.	**Hizen** ‖ (*ex* Retvizan) 1922	12,700	374	$72\frac{1}{4}$	25	16,000 My.	Philadelphia	1900	1902	..	9–4 K.S.	4	6–2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 smaller.	2	18·0	800 / 2000	791
a.c.	**Ibuki** ‖ 1922	14,620	$450\frac{1}{2}$	$75\frac{1}{2}$	$26\frac{1}{4}$	27,000 My. tur.	Kure	1907	1910	..	7–4 K.S.	2	5 K.S.	..	9 K.S.	$5\frac{1}{2}$ K.S.	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 8 l. and M.	3 (sub.)	22	600 / 2000	846
„	**Idzumo**	9750	400	$68\frac{1}{2}$	$24\frac{1}{2}$	17,300 B. *t.*	Elswick	1899	1900	..	$7–3\frac{1}{2}$ H.N.S.	$2\frac{1}{2}$	5 H.N.S.	..	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 $2\frac{1}{2}$-*pr.*	4 (sub.)	22·0 / 21·7 *t*	600 / 1412	688
„	**Iwate**							1900	1901												

* The battle-cruisers Akagi and Amagi will be converted into aircraft-carriers. The Atago and Takao, of the same class, will not be laid down.
† The complements of Japanese ships vary considerably from time to time. These given are the latest reports.

a.c.	**Ikoma** ‖ 1922	. .	13,750	440	75	26	22,670 My.	Kure .	1906	1908	..	7–5 K.S.	1½	..	..	7 K.S.	5 K.S.	4 *12-in.*, 10 *6-in.*, 8 *4·7-in.*, 2 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·0	600 / 2000	918
b.	**Ise** 1939	. .	31,260	640	94	28½	45,000 P. tur.	Kobe . (Kawasaki)	1916	1917	..	12 K.S.	3	6 K.S.	..	12 K.S.	6 K.S.	12 *14-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A.	6 (sub.)	23·0	1000 / 4000	1360
b.	**Kaga** * 1922	. .	40,600	700	..	..	..	Kobe (Kawasaki)	1921	..	..	14 K.S.	..	..	..	..	..	8 *16-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A.	8	23·5	..	..
b.	**Kashima** ‖ 1922	. *Pl.* 31.	16,400	425	78⅛	27	17,280 Nic.	Elswick	1905	1906	..	9–4 K.S.	3–2½	6	6	9 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 5 M., 2 l.	5 (sub.)	19·2 *t*	750 / 2150	946
b.	**Katori** ‖ 1922	. *Pl.* 31.	15,975	420	78	27	18,500 *t*, Nic.	Barrow	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 5 M., 2 l.	5 (sub.)	19·5 *t*	750 / 1800	946
b.c.	**Kirishima** 1936	. *Pl.* 32.	27,500	653½	92	27½	64,000 My P. t.	Nagasaki (Mitsubishi)	1913	1915	..	8–6 K.S.	2¾	..	..	10 K.S.	7 K.S.	8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A.	8 (sub.)	27·5	1100 / 4000	980
,,	**Kongo** . 1934	. *Pl.* 32.	27,500	653½	92	27½	64,000 Y. P. t.	Barrow	1913	1913	2,500,000	8–6 K.S.	2¾	..	..	10 K.S.	7 K.S.	8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A.	8 (sub.)	27·5	1100 / 4000	980
a.c.	**Kurama** ‖	. .	14,620	450½	75½	26¼	27,000 My.	Yokosuka	1907	1909	..	7–4 K. S.	2	5 K.S.	..	9 K. S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·2	600 / 2000	846
b.	**Mikasa** ‖ 1922	. .	15,362	400	76	27¼	16,431 B.	Barrow	1900	1901	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 4 *10-in.*, 14 *6-in.*, 26 small	4 (sub.)	18·5 *t*	700 / 1520	820
b.	**Mutsu** * 1942	.	33,800	700	..	..	46,000	Yokosuka	1920	1921	..	12 K.S.	..	..	..	..	..	8 *16-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A.	8 (4 sub.)	23·5	..	1336
b.	**Nagato** 1941	. *Pl.* 28.						Kure .	1919	1920												
b.	**Satsuma** ‖ 1922	. *Pl.* 31.	19,350	450	83½	27½	19,370 My.	Yokosuka	1906	1910	..	9–5 K. S.	2–3	8	.	9	6	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*, 4 *12-pr.*, 8 l. and M.	5 (sub.)	18·5	750 / 2860	940
b.	**Settsu** ‖ 1922	. *Pl.* 30.	20,800	500	84	27	26,500 tur.	Kure	1911	1912	..	12–9½ K.S.	2½	9 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 10 *6-in.*, 8 *4·7-in.*, 16 small, l. and M.	5 (sub.)	20·5	900 / 2500	991
b.	**Tosa** * 1922	. .	40,600	700	..	..	..	Nagasaki (Mitsubishi)	..	..	..	14 K.S.	..	..	..	..	..	8 *16-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A.	8	23·5	..	..
a.c.	**Yakumo**	. .	9850	407¾	64¼	23¾	16,000 B.	Stettin	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	698
b.	**Yamashiro** 1938	. *Pl.* 29.	30,600	630	94	28½	40,000 tur.	Yokosuka	1915	1917	..	12 K.S.	3	6 K.S.	..	12 K.S.	6 K.S.	12 *14-in.*, 16 *6-in.*, 4 *12-pr.* A.A.	6 (sub.)	23·0	..	..

* The battleships Kaga and Tosa will not be completed. The ships of the new programme will not be put in hand.

The battleship Aso (*ex*-Bayan), 8100 tons, completed at La Seyne in 1903, and having a complement of 791 officers and men, is now classed as a mine-layer.

The Iwami is rated as a coast-defence ship; also the armoured-cruisers Kasuga and Nisshin, 7630 tons, completed at Sestri Ponente, 1904, and the following armoured-ships and light cruisers Fuji, Chihaya, Akushi, Asama, Chitose, Chiyodo, Shikishima, Tokiwa, Suma, Adzuma, and Tsushima.

‖ The battleships and armoured-cruisers (classified as battle-cruisers in the Appendix to the Washington Treaty), so marked, were to be scrapped forthwith.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l.cr.	Chikuma	4950	440	$46\frac{1}{2}$	$16\frac{3}{4}$	22,500 Cur. t. My.	Sasebo	1911	1912	..	$2\frac{1}{4}$	..	8 *6-in.*, 4 *3-in.*, 4 M.	3	26	500 1000	413
„	Hirado	4950	440	$46\frac{1}{2}$	$16\frac{3}{4}$	22,500 P. tur. My.	Kobe	1911	1912	..	$2\frac{1}{4}$	..	8 *6-in.*, 4 *3-in.*, 4 M.	3	26	500 1000	390
„	Isudzu						Uraga	Bldg.	..								
„	Kiso	5500	500	$46\frac{3}{4}$	$15\frac{3}{4}$	..	Nagasaki (Mitsubishi)	1920	..	..	2	..	7 *5·5-in.*, 2 *12-pr.* A.A.	8	36·0	..	439
„	Kitakami						Sasebo	1920	1921								
„	Kuma						Sasebo	1919	1920								
Scout	Mogami	1350	300	$31\frac{1}{2}$	$9\frac{3}{4}$	8000 turbines	Nagasaki	1908	1909	..	..	..	2 *4·7-in.*, 4 *12-pr.*	2	23·0	95 350	167
l.cr.	Nagara	5500	500	$46\frac{3}{4}$	$15\frac{3}{4}$	..	Sasebo	1921	..	..	2	..	7 *5·5-in.*, 2 *12-pr.* A.A.	8	36·0	..	439
„	Natori						Nagasaki (Mitsubishi)	Bldg.									
„	Oh-i	5500	500	$46\frac{3}{4}$	$15\frac{3}{4}$	..	Kobe	1920	..	..	2	..	7 *5·5-in.*, 2 *12-pr.* A.A.	8	36·0	..	439
g.b.	Saga	785	210	$29\frac{1}{2}$	$7\frac{1}{2}$	1600	Sasebo	1912	1912	..	..	..	1 *4·7-in.*, 2 *3-in.*, 3 M.	..	15	90 190	87
l. cr.	Tama	5500	500	$46\frac{3}{4}$	$15\frac{3}{4}$	..	Nagasaki (Mitsubishi)	1920	1921	..	2	..	7 *5·5-in.*, 2 *12-pr.* A.A.	8	36	..	439
„	Tatsuta	3500	440	41	13	..	Sasebo	1918	1919	..	..	..	4 *5·5-in.*, 1 *12-pr.* (mining equipment)	6	31	..	322
„	Tenryu						Yokosuka										

,,	**Tone**	4100	400	47	16¾	15,000 My.	Sasebo . .	1907	1909	..	2½	..	2 *6-in.*, 10 *4·7-in.*, 2 *12-pr.*, 2 l.	3	23·0	300 900	401
g.b.	**Uji**	620	180½	27½	10	1000 B.	Kure . .	1903	1903	..	..	..	4 *12-pr.*, 3 M. . . .	..	13·0	100	80
l. cr.	**Yahagi** . . .	4950	440	46½	16¾	22,500 P. tur. My.	Nagasaki . .	1911	1912	..	2¼	..	8 *6-in.*, 4 *3-in.*, 4 M. . .	3	26	500 1000	413
,,	**Yodo** . . .	1250	280	32	9¾	6500	Kobe . .	1907	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.* . .	2	22·0	125 340	166
,,	**Yura**	5500	500	46¾	15¾	..	Sasebo . .	Bldg.	..	..	2	..	7 *5·5-in.*, 2 *12-pr.* A.A. .	8	36	..	439

A light cruiser of the Kuma class, named Kinu, was laid down at the Kawasaki yard in January, 1921, and four others are to be built as follows: Ayase (Sasebo), Otonase (Nagasaki), Abukama (Uraga) and Minase (Uraga).

The river gunboat Nakoso is in hand at Yokohama, and the Katata, Hodzu, Hira and Seta, of the same class, are to be built.

Submarine depôt ships Karasaki (*ex*-Ekaterinoslav), 6170 tons, 5 light guns; Komahasi and Nagaru Maru. Minelayers: Tsugaro (*ex*-Pallada), 6630 tons; two building or projected; 12 converted merchant vessels. Seaplane carrier Wakamiya, 7600 tons. Aircraft carriers Hosho completing, and Shokaku building; also the ex-battle-cruisers Akagi and Amagi to be converted.

Repair ship Kwanto Maru, 6190 tons. Colliers: Noshima, Maroto. Oil ships: Erimo, Notari, Shiretoko, Sunesaki Maru, Tsurugisaki.

River gunboats Toba, 250 tons; Fushimi, 180 tons; and Sumida, 126 tons. About 20 auxiliaries.

In all thirteen cruisers of the Kuma and Kinu types are in hand or have just been completed.

NETHERLANDS.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
a.g.b.	Brinio . . .																				
,,	Friso . . .	540	171	28	$9\frac{1}{4}$	1200	Amsterdam .	1912 1913	1915	..	2 K.S.	$\frac{3}{4}$	..	..	..	..	4 *4·1-in.* semi-automatic, 2 M.	..	14·5	34 Oil	52
,,	Gruno . . .																				
c.d.s.	De Ruyter . . *Pl.* 33.	5000	$316\frac{3}{4}$	$51\frac{1}{2}$	19	6377 *t.*	Rotterdam .	1901	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 6 *5·9-in.*, 4 *2·9-in.*, 4 *1·4-in.*	3 2 sub.	14·5 *t*	830	347
,,	Hertog Hendrik . *Pl.* 33.	5000	$316\frac{3}{4}$	50	19	6282 *t.*	Amsterdam .	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 6 *5·9-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 M.	3	14·5	830	347
,,	Jacob van Heems-kerck	4921	$316\frac{3}{4}$	50	19	6396 *t.*	Amsterdam .	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	6 H.N.S.	2 *9·4-in.*, 6 *5·9-in.*, 6 *2·9-in.*, 4 *1·4-in.*, 2 l.	3 2 sub.	14·5	610	351
,,	Marten Tromp . *Pl.* 33.	5216	330	50	$18\frac{3}{4}$	6405 *t*	Amsterdam .	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*, 2 M.	3 2 sub.	14·5 *t*	830	349
,,	De Zeven Provin-cien	6426	$339\frac{1}{2}$	56	$20\frac{1}{4}$	8516 Y.	Amsterdam .	1909	1910	..	6–4 K.S	2	..	..	10 K.S.	4 K.S.	2 *11-in.*, 4 *5·9-in.*, 10 *2·9-in.* semi-auto., 2 M.	..	15·3	1030	409

The Zeven Provincien is assigned to the Fleet of the Dutch East Indies. The light cruisers Java and Sumatra, intended for service in the East Indies, are building respectively at Flushing and Amsterdam. The Sumatra was launched at Amsterdam on December 30, 1920, the Java August 21, 1921, 7050 tons, 65,000 H.P., 30 knots, ten 6-in., four 3-in. guns. Light cruisers: Gelderland (1900), 4030 tons, now used as gunnery school; Zeeland (1897), 3900 tons, two 5·9-in., eight 4·7-in., two 2·9-in., four 1·4-in., 2 M., 19·4 knots. Four gunboats for the defence of the Zuyderzee. There are four modern mine-layers, Medusa, Hydra, Kotei, and Mataram, and Van Meerlant and Douwe Aukes, 750 tons, three 2·9-in. semi-auto., completed 1922; two others, Triton and Vulcanus, and six old vessels converted to the same use. Four mine-sweepers (I.–IV.), 275–300 tons, 1 machine-gun. In 1920 two old gunboats were in commission in the East Indies, as well as four mine-layers, Assahan, Serdang, Siboga, and Hercules. Surveying vessels in the East Indies, Van Gogh, Van Doorn, Lombok, Sumbawa, Tydeman, Eridanus. Depôt ship for submarines (Pelikaan), 2487 tons, four 2·9-in. semi-auto., 3 M., speed 12 knots, completed August, 1922 (to leave for the East Indies).

NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Eidsvold . / Norge . *Pl.* 33.	4233	290	$50\frac{1}{2}$	$16\frac{1}{2}$	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.* 6 *6-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·9 *t*	400 / 600	270
„ / „	Harald Haarfagre . / Tordenskjold	3920	280	$48\frac{1}{2}$	$16\frac{1}{2}$	3700	Elswick	1896 / 1897	1898 / 1899	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *$1\frac{1}{2}$-pr.*	2 sub.	17·2 *t*	200 / 500	249

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b	Æger . . .	387	$108\frac{1}{2}$	$29\frac{1}{2}$	8	450	Horten .	1892	1893	..	$1\frac{1}{2}$	..	1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.* . .	..	9·0	..	43
g.b.	Frithjof . .	1349	$216\frac{1}{2}$	$32\frac{3}{4}$	$13\frac{1}{4}$	2800	Horten .	1896	1898	..	..	..	2 *4·7-in.*, 6 *12-pr.*, 4 *1·4-in.*, 2 l. . .	3 sub.	15·0	120	166
g.v.	Heimdal . .	620	$167\frac{1}{4}$	$26\frac{3}{4}$	$11\frac{3}{4}$	700	Christiania .	1892	1893	..	..	..	4 *12-pr.*	..	12·0	62	62

Seven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns.

SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.** *Pl.* 34.	15,500	459	78¾	25½	15,500Y. P. tur.	Ferrol	1913	1916	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	1850	735
a.c.	**Cataluña**	7405	347¾	61	23¼	10,580	Cartagena	1900	1908	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l., 10 *1-pr.*	..	18 *t*	1178	546
”	**Emperador Carlos V.** *Pl.* 34.	9900	404	67	27½	15,000	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *4·1-in.*, 10 *6-pr.*, 8 *1-pr.*, 2 M., 2 l.	2	19·0	2008	583
b.	**España**	15,460	459	78¾	25½	15,500Y. P. tur.	Ferrol	1912	1913	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *12-pr.*, 2 *3-pr.*, 2 M.	..	20·0 *t*	1305	700
b.	**Jaime I.** *Pl.* 34.	15,700	433					1914	1915										20·2	1850	
b.	**Pelayo**	9733	341	65¼	25½	8000 Nic.	La Seyne	1887	1888 1897	..	17¾	4	..	..	19¼	4 H.S.	2 *12·6-in.*, 2 *11-in.*, 9 *5·5-in.*, 2 l., 12 *6-pr.*, 9 *1-pr.*	3	16·0	676	620
a.c.	**Princesa de Asturias**	7427	347¾	61	23¾	11,791	Cadiz	1896	1902	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l., 10 *1-pr.*	..	18·0	1007	546

SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	787	213	30	9½	1100 Y	Cartagena	1911	1912	..	..	..	4 *14-pr.*, 2 M.	..	14·0	148	121
to.g.b.	Don Alvaro de Bazán	810	236	27	11¼	3577	Ferrol	1897	1899	..	..	..	6 *6-pr.* } 2 *2½-pr.*, 2 M.	..	19·0	168	121
„	Doña María de Molina	810	236	27	11¼	3500	Ferrol	1896	1898				8 *6-pr.* }				
l. cr.	Extremadura	2100	288	36	16¼	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *6-in.*, 4 *1-pr.*	..	19·0	425	266
g.b.	Lauria	787	213	30	9½	1100 Y	Cartagena	1911	1912	..	..	..	4 *3-in.*, 2 M.	..	14·0	..	121
„	Laya								1911								
to.g.b.	Marqués de la Victoria	810	233	26¾	11	2711	Ferrol	1897	1900	..	..	..	8 *6-pr.*, 2 M.	..	19·0	..	121
g.b.	Recalde	787	213	30	9½	1100 Y	Cartagena	1911	1911	..	..	..	4 *3-in.*, 2 M.	..	13·8	..	121
l. cr.	Reina Regente	5778	363	52½	16¼	11,000 W.T.	Ferrol	1906	1910	..	..	3	10 *5·9-in.*, 12 *2·2-in.*, 2 l., 8 *1-pr.*	..	19·5	1178	452
„	Reina Victoria Eugenia	5590	462	50	15¾	25,000 T.	Ferrol	1920	..	..	2 (1½ side)	..	9 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	4 (sub.)	25·0	650 coal & oil	..
„	D. Blas Lezo / Mendez Nuñez	4650	462	46	14½	30,000	Ferrol	Bldg.	..	..	..	..	6 *6-in.*, 4 *3-pr.*, 4 M.	4	29	..	..

Three coastal gunboats of 1500 tons and 18 knots are in hand at Ferrol.

Hernán Cortés, Vasco Nuñez de Balboa, Marqués de Molíns, MacMahon, Perla, gun-vessels.

Light cruiser Rio de la Plata, 1773 tons, converted to a mine-layer. Esmeralda and twelve other mine-trawlers and auxiliaries. Submarine salvage vessel Canguru, 2100 tons (1916).

SWEDEN.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.b.	**Aeran**	3650	287	49¼	16·7	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.*	2 sub.	17·2 *t*	330	300
„	**Dristigheten**	3620	285	48·5	17	5400 Y.	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.*	2 sub.	16·5	310	250
a.c.	**Drottning-Victoria** *Pl. 35.*	7605	396·7	61	21½	22,000 tur. Y.	Gothenburg	1917	1921	666,000	8–6 K.S.	1½	4 H.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M.	2 sub.	22·0 *t*	350 / 800	450
a.c.	**Fylgia**	4980	377·6	48·5	20·6	12,440 Y. *t*	Stockholm	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	5 K.S.	8 *5·9-in.*, 14 *2·2-in.*, 2 *1·4-in.*	2 sub.	22·5 *t*	350 / 900	341
c.d.b.	**Gustav V.** *Pl. 35.*	7605	396·7	61	21½	22,000 tur. Y.	Malmö	1917	1922	666,000	8–6 K.S.	1½	4 H.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M.	2 sub.	22·0	350 / 800	450
„	**Manligheten**	3840	287	49¼	17·4	7400 Y.	Malmö	1903	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *2·2-in.*, 1 *1·4-in.*	2 sub.	17·0	400	300
„	**Oscar II** *Pl. 35.*	4658	313·6	50·5	18	9000 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *6-in.*, 10 *2·2-in.*, 4 *1·4-in.*	2 sub.	18·0	350 / 500	339
„	**Sverige** *Pl. 35.*	7605	392·7	61	21½	20,000 tur. Y.	Gothenburg	1914	1917	666,000	8–6 K.S.	1½	4 K.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M.	2 sub.	22·0	350 / 800	450
„	**Tapperheten**	3990	287	49¼	17 7	6000 Y.	Malmö	1901	1903	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.*	2 sub.	16·5	330	300
„	**Wasa**	3745	287	49¼	17	6000 Y.	Stockholm	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.*	2 sub.	16·5	330	300

All the ships are now rated as coast-defence battleships, with the exception of the Fylgia. Older coast-defence ships Thordon, Torfing, Göta and Thule (1891–1893), 3393 tons, 1 8·2-in., 7 5·9-in. guns; Oden, Thor, Niord (1897, 1899, 1899), 3715 tons, 2 9·8-in., 6 4·7-in. guns. Mine cruiser Clas Fleming, 1800 tons, 4 4·7 in., 20 knots. Torpedo gunboats Claes Horn, Jacob Bagge, Oernen, Psilander, 830 tons, 2 4·7-in., 4 2·2-in., 20 knots. Four gunboats, 400–700 tons.

UNITED STATES.—Armoured Ships.

N.B.—All the ships and vessels of the United States Navy, of every class, have been differentiated as belonging to the First Line or Second Line. In the following lists the First Line ships are marked with an asterisk. The ships which were under construction, belonging to the 1916 programme, but are not to be completed in accordance with the Washington Treaty, are retained here, with the mark ¶, as a record. Those which were to be scrapped forthwith have the mark ||.

Class.	NAME. Date for Scrapping.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. §	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	*Arizona 1937	31,400	600	97	28¾ †	34,000 B. & W. P. tur. (G.)	New York (Navy Yard)	1915	1916	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 14-in. (45 cal.), 14 5-in., 4 3-in. A.A., 4 6-pr.	4 (sub.)	21·0	2914 Oil	1002
b.	*Arkansas 1935 Pl. 41.	26,000	554	93¼	28½ †	28,533 P. tur.	Camden, N.J. (N.Y.S.B.Co.)	1911	1912	964,000	11–5 K.S.	3	..	8–6 K.S.	11 K.S	6½	12 12-in., 16 5-in., 2 3-in. A.A., 4 3-pr., 4 M., 1 l.	2 (sub.)	21·0 t	1650 / 2500	1115
b.	*California 1941 Pl. 38.	32,300	624	97½	30¼	28,500 Tur. (G.)	Mare Island (Navy Yard)	1919	1921	..	14 K.S.	..	..	..	18 K.S.	9 K.S.	12 14-in. (50 cal.), 14 5-in., 4 3-in. A.A, 9 M. & l.	2 (sub.)	21·0	2914 Oil	1067
a. c.	Charleston	9700	424	66	35 †	27,500 B.&W.	Newport News	1904	1906	563,030	4 H.S	3	4 H.S.	..	4 H.S.	..	12 6-in., 4 3-in., 2 3-in. A.A., 10 M., 2 l.	..	22·0	650 / 1500	664
a.c.	Charlotte (ex North Carolina)	14,500	502	72¾	25 ‡	29,785 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 10-in., 4 6-in., 12 3-in., 2 3-in. A.A., 4 6-pr., 15 M. & l.	4 sub.	21·9 t	900 / 2000	845
b.	*Colorado 1942 Pl. 37.	32,600	600	97½	30½ †	28,900 B. & W. tur.	N.Y.S.B. Co.	1921	..	1,383,000	16–14 K.S.	..	..	..	18 K.S.	9 K.S.	8 16-in. (45 cal.), 14 5-in., 4 3-in. A.A., 4 6-pr.	2 (sub.)	21·0	..	..
b.	|| Connecticut 1922	16,000	450	76¾	26¾	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 12-in., 8 8-in., 12 3-in., 2 3-in. A.A., l., M., and A.A.	4 (sub.)	18·8 t	900 / 2200	803
b.c. ,,	¶*Constellation ¶*Constitution Pl. 43.	43,500	850	105½	31 †	180,000 tur. electric	Newport News / Philadelphia	..	..	Actual cost and supplement.	..	..	..	..	..	..	8 16-in. (50 cal.), 16 6-in., 4 3-in. A.A., 4 6-pr.	8 (4 sub.)	33·3	Oil	1315
b.	*Delaware 1922 Pl. 42.	20,000	510	85¼	27 †	28,578 B. & W.	Newport News	1909	1910	817,300	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 12-in., 14 5-in., 2 3-in. A.A., 16 M. & l.	2 (sub.)	21·5 t	1000 / 2500	927
b.	*Florida 1934 Pl. 42.	21,825	510	88¼	28½ †	27,036 B. & W. P. tur.	New York (Navy Yard)	1910	1911	1,280,000	11	..	10	..	11	5	10 12-in., 16 5-in., 4 3-in. A.A., 6 l. and M.	2 (sub.)	22·1 t	1000 / 2300	1014
a.c.	Frederick (ex Maryland)	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 8-in., 4 6-in., 10 3-in., 2 3-in. A.A., 14 l.	2 (sub.)	22·4 t	900 / 1850	829

§ The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates. Congress fixed the limit of cost of the six battleships of the North Carolina class at 21,000,000 dollars each, but the Iowa and Massachusetts were being built on the basis of actual cost plus a fixed profit of 1,650,000 dollars. The six battle cruisers were being built on a cost plus 10 per cent. basis, with limit of cost of 23,000,000 dollars.

† Mean draught. ‡ Including armour, but not armament.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME. Date for Scrapping.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. $	Armour. Belt.	Deck.	Side above Belt.	Bul head.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complemt.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots	tons	
Super-posed turrets.	‖**Georgia** . . 1922	14,948	435	76¼	23¾ †	25,088*t* Nic.	Bath, Me. .	1904	1906	737,700	1 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 17 l.	4 (sub.)	19·2 *t*	900 / 1704	812
a.c.	**Huntington** . (*ex* West Virginia)	13,680	502	69½	24½	31,437 B. & W.	Newport News	1903	1905	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 4 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 8 *1-pr.*, 4 M., 1 l.	2 (sub.)	22·1 *t*	900 / 2000	829
a.c.	**Huron** . . (*ex* South Dakota)	13,680	502	69½	26	28,598 B. & W.	S. Francisco.	1904	1907	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 4 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 7 *1-pr.*, 1 l.	2 sub.	22·0 *t*	900 / 2000	829
b.	***Idaho** . . 1939	32,000	624	97¾	30 †	32,000 B. & W. P. tur. (G.)	Camden, N.J. (N.Y.S.B. Co.)	1917	1919	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 14 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.*, 4 M.	2 (sub.)	21·0	2914 Oil	1007
b.	¶***Indiana**. . *Pl.* 36.	43,200	660	106	33 †	60,000 T. electric	New York Navy Yard	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A.	2 (sub.)	23·0	Oil	1470
b.	¶***Iowa** . . *Pl.* 36.	43,200	660	106	33 †	60,000 tur.electric	Newport News	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A.	2 (sub.)	23·0	Oil	1470
b.	‖**Kansas** . . 1922	16,000	450	77	26¾	19,545 B. & W.	Camden, N.J.	1905	1907	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 14 M. and l.	4 (sub.)	18·1 *t*	900 / 2200	854
b.c.	¶***Lexington** . *Pl.* 43.	43,500	850	105½	31 †	180,000 tur.electric	Quincy, Mass.	..	..	..	..	..	..	..	..	..	8 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A. M. and l.	8 (4 sub.)	33·3	Oil	1315
b.	‖**Louisiana** . 1922	16,000	450	76¾	26¾	20,748 B. & W.	Newport News	1904	1906	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 24 M. and l.	4 (sub.)	18·8 *t*	900 / 2200	803

b.	*Maryland 1941 *Pl. 37.*	32,600	600	97¼	30½ †	28,900 T.	Newport News	1920	1922	1,383,000	16–14 K.S.	..	..	..	18 K.S.	9 K.S.	8 *16-in.* (45 cal.), 14 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.*	2 (sub.)	21·0	..	..
b.	¶*Massachusetts *Pl. 36.*	43,200	660	106	33 †	60,000 B. & W. tur.electric	Quincy, Mass. Bethlehem	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A.	2 (sub.)	23·0	Oil	1470
b.	‖Michigan 1922	16,000	450	80¼	24½ †	16,310 B. & W.	Camden, N.J.	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 12 *3-in.*, 2 *3-in.* A.A., 2 *3-pr.*, 2 M., 1 l.	2 (sub.)	18·8 *t*	900 2200	669
b.	‖Minnesota 1922	16,000	450	77	26¾	20,235 B. & W.	Newport News	1905	1907	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 14 *1-pr.*, 4 M.	4 (sub.)	18·8 *t*	900 2200	881
b	*Mississippi 1938	32,000	624	97¾	30 †	32,000 B. & W. Cur. t. (G.)	Newport News	1917	1917	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 14 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.* 14 l.	2 sub.	21·0	2914 Oil	..
a.c.	Missoula (*ex* Montana)	14,500	502	72¾	27 †	27,938 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 4 *6-in.*, 2 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 10 *1-pr.*, 4 M., 1 l.	4 sub.	22·2 *t*	900 2000	845
b.	¶*Montana *Pl. 36.*	43,200	660	106	33 †	60,000 tur.electric	Mare Island Cal. Navy Yard	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A A.	2 (sub.)	23·0	Oil	1470
Superposed turrets.	‖Nebraska 1922	14,948	435	76¼	23¾ †	21,283 B. & W.	Seattle.	1904	1907	767,210	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 20 *1-pr.*, 4 M., 1 l.	4 sub.	19·1 *t*	900 1900	812
b.	*Nevada 1936 *Pl. 39.*	27,500	575	95	28½ †	23,312 Y. Cur. tur.	Quincy, Mass. (Fore River)	1914	1915	1,211,312	13½–8 K.S	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.* (45 cal.), 12 *5-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 18 l. & M.	2 sub.	20·5	1300 2000	..
b.	‖New Hampshire 1922	16,000	450	77	26¾	19,100 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 14 *1-pr.*, 4 M.	4 sub.	18·2 *t*	900 2350	916
Superposed turrets.	‖New Jersey 1922	14,948	435	76¼	23¾ †	23,089 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *3-in.*, 2 *3-in.* A A., 4 *3-pr.*, 8 *1-pr.*, 4 M., 1 l.	4 sub.	19·4 *t*	900 1900	812
b.	*New Mexico 1939	32,000	624	97¾	30 †	27,500 B. & W. Electric drive	New York (Navy Yard)	1917	1918	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (50 cal.), 14 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.* 6 l. & M.	2 (sub.)	21·4	2914 Oil	..
"	*New York 1935 *Pl. 40.*	27,000	565	95¼	28½ †	29,687 B. & W.	New York (Navy Yard)	1912	1914	1,315,114	12–4 K.S	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.* (45 cal.), 16 *5-in.*, 2 *3-in.* A.A., 4 *3-pr.* 13 l. & M.	4 sub.	21·5	2200 2850	1074

§ See note on page 347. † Mean draught. ‡ Including armour, but not armament.

UNITED STATES.—Armoured Ships—*continued*.

Class.	NAME. Date for Scrapping.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. $	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	¶*North Carolina *Pl.* 36.	43,200	660	106	33 †	60,000 tur.electric	Norfolk, Va. (Navy Yard)	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A.	2 (sub.)	23·0	Oil	1470
b.	*North Dakota. 1922 *Pl.* 42.	20,000	510	85¼	28¾ †	31,000 B. & W. Cur. tur.	Quincy, Mass. (Fore River)	1908	1910	899,500	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-in.* A.A., 2 *3-pr.*, 14 l., 4 M.	2 sub.	21·0 *t*	1000 / 2500	960
b.	*Oklahoma . 1936 *Pl.* 39.	27,500	575	95	29¾ †	21,703 B. & W.	New York .	1914	1915	2,200,000	13½–8 K.S.	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.* (45 cal.), 12 *5-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 19 l. & M.	2 sub.	20·5	1300 / 2000	..
b.	*Pennsylvania. 1937	31,400	600	97	29¾ †	31,500 B. & W. Cur. tur.	Newport News	1915	1916	1,485,000	14 K.S.	3	..	..	18 K.S.	..	12 *14-in.* (45 cal.), 12 *5-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 14 l., 4 M.	2 sub.	21·0	2914 Oil	1002
a.c.	Pittsburg .	13,680	502	69½	26	28,600 Nic.	Philadelphia (Cramp)	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 4 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 18 *1-pr.*, 8 M., 1 l.	2 sub.	22·4 *t*	900 / 2000	829
a. c.	Pueblo . . (*ex* Colorado)	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 4 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 12 *1-pr.*, 4 M., 1 l.	2 (sub.)	22·2 *t*	900 / 2000	829
b.c.	¶*Ranger . . *Pl.* 43.	43,500	850	105½	31 †	180,000 tur.electric	Newport News	..	..	..	..	..	..	..	..	..	8 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A., M. & l.	8 (4 sub.)	33·3	Oil	1315
Super-posed	‖Rhode Island . 1922	14,948	435	76¼	26 †	20,310 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 8 *1-pr.*	4 sub.	19·0 *t*	900 / 1900	812
a.c.	Rochester . (*ex* Saratoga)	8200	380½	64¾	26¼ †	17,075	Philadelphia (Cramp)	1891	1893 1909	613,377	4 H.S.	2½	.. K.S.	..	6½ H.S.	5–4 H.S.	4 *8-in.*, 8 *5-in.*, 2 *3-in.* A.A., 19 l. & M.	..	21·0 *t*	750 / 1334	498

a.c.	St. Louis .	9700	424	66	22½ †	27,264 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4 K.S.	3	4–3	..	4 K.S.	..	12 *6-in.*, 4 *3-in.*, 2 *3-in.* A.A., 2 *3-pr.*, 12 l. & M.	..	22·1 *t*	650/1500	664
b.c.	¶*Saratoga . *Pl.* 43.	43,500	850	105½	31 †	180,000	N.Y. Ship-building Co.	..	..	..	..	..	..	..	..	..	8 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A., M. & l.	8 (4 sub.)	33·3	Oil	1315
a.c.	Seattle . . (*ex* Washington)	14,500	502	72¾	27	27,152 B. & W.	Camden, N.J.	1905	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 4 *6-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 4 M., 11 l.	4 sub.	22·3 *t*	900/2000	858
b.	‖South Carolina 1922	16,000	450	80¼	27 †	18,357 B. & W.	Philadelphia (Cramp)	1908	1909	730,000	11–9	3	8	10	10–8	8	8 *12-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 M., 11 l.	2 sub.	18·9 *t*	900/2200	669
b	¶*South Dakota *Pl.* 36.	43,200	660	106	33 †	60,000 tur.electric	New York Navy Yard	..	..	..	..	..	..	..	..	..	12 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A.	2 (sub.)	23·0	Oil	1470
b.	*Tennessee . 1940 *Pl.* 38.	32,300	600	97¼	30¼ †	28,500 T.	New York Navy yard	1919	1920	..	14 K.S.	..	..	..	18 K.S.	9 K.S.	12 *14-in.* (50 cal.), 14 *5-in.*, 4 *3-in.* A.A., 9 M. & l.	2 sub.	21·0	2941 Oil	1007
b.	*Texas . . 1935 *Pl.* 40.	27,000	565	95¼	28½ †	28,100 B. & W. *t*	Newport News	1912	1914	1,166,000	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.* (45 cal.), 16 *5-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 13 l.	4 sub.	21·1 *t*	2200/2850	1074
b. c.	¶*United States *Pl.* 43.	43,500	850	105½	31 †	180,000 tur. elec.	Philadelphia Navy yard	..	..	..	..	..	..	..	..	..	8 *16-in.* (50 cal.), 16 *6-in.*, 4 *3-in.* A.A., M. & l.	8 (4 sub.)	33·3	Oil	1315
b.	*Utah . . 1934 *Pl.* 42.	21,825	510	88¼	28½	28,477 B. & W. *t.*, P. tur.	Camden, N.J.	1909	1911	813,500	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-in.* A.A., 4 *3-pr.*, 2 M. & l.	2 sub.	21·6 *t*	1000/2300	1014
b.	‖Vermont . . 1922	16,000	450	77	26¾	17,982 B. & W.	Quincy, Mass.	1905	1907	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 8 *1-pr.*, 2 M., 1 l.	4 sub.	18·33 *t*	900/2200	854
Super-posed	‖Virginia . . 1922	14,948	435	76¼	23¾ †	22,841 Nic.	Newport News	1904	1906	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *3-in.*, 2 *3-in.* A.A., 8 *1-pr.*, 2 M., 1 l.	4 sub.	19·0 *t*	900/1900	812
b. / *b.*	‖*Washington 1922 / *West Virginia 1942 *Pl.* 37.	32,600	600	97¼	30½ †	28,900 T.	N.Y.S.B. Co. / Newport News	1920 / 1921	..	1,383,000	16–14 K.S.	..	..	..	18 K.S.	9 K.S.	8 *16-in.* (45 cal.), 14 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.*	2 sub.	21·0	..	..
b.	*Wyoming . 1934 *Pl.* 41.	26,000	554	93¼	29¾ †	31,437 B. & W. P. tur.	Philadelphia	1911	1912	963,800	11–9 K.S.	..	..	8–6 K.S.	11 K S.	8	12 *12-in.*, 6 *5-in.*, 4 *3-in.* A.A., 4 *6-pr.*, 4 M., 13 l.	2 sub.	21·2 *t*	1650/2500	1115

§ See note on p. 347. † Mean Draught. ‡ Including armour, but not armament.

Monitors Monadnock, 3990 tons, Tallahassee (*ex* Florida) 3235 tons, Cheyenne (*ex* Wyoming) 3218 tons. The Alabama, Illinois, and Kentucky have been removed from the list; also the Ohio, 12,500 tons, four 12-in. guns, which has been used as a W.T. experimental ship and subjected to bombing practice. Under the Washington Treaty the United States may retain the old battleships Illinois and Oregon for non-combatant purposes.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. \$	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
p.v.	Albany	3487	346	$43\frac{3}{4}$	29	7500	Elswick	1899	1900	247,611	3	$3-1\frac{1}{4}$ shields	8 *5-in.*, 1 *3-in.* A.A., 2 *3-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	20·5 *t*	$\frac{512}{747}$	356
g.v.	Asheville	1575	225	$41\frac{1}{4}$	$11\frac{1}{4}$†	800 P. tur.	Charleston	1918	1919	176,718	..	..	3 *4-in.*, 2 *3-pr.*	..	12	..	157
scout cr.	Birmingham	3750	420	47	$18\frac{3}{4}$†	15,670 Express	Quincy, Mass.	1907	1908	301,000	$2-1\frac{1}{2}$	..	4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 4 M.	2 sub.	24·3 *t*	$\frac{1250}{1433}$	356
p.v.	Chattanooga	3200	292	44	17	5303 B.&W.	Elizabeth Port	1903	1904	212,325	2	..	6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	16·65 *t*	$\frac{470}{700}$	302
scout cr.	Chester	3750	420	47	$18\frac{3}{4}$†	16,000 Nor. turb.	Bath, Me.	1907	1908	337,000	$2-1\frac{1}{2}$	..	4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 4 M.	2 sub.	26·5 *t*	$\frac{1250}{1433}$	356
” ”	*Cincinnati *Concord *Pl.* 44.	7500	550	55	19†	90,000	Tacoma. Wash. Philadelphia (Cramp)	1921	..	Cost and fee	..	..	12 *6-in.*, 2 *14-pr.* A.A., 2 *3-pr.*	2 twin.	33·7	Oil.	356
p.v.	Cleveland	3200	292	44	17	4640 B.&W.	Bath, Me.	1901	1903	212,325	2	..	6 *5-in.*, 1 *3-in.* A.A., 2 *1-pr.*, 2 M., 1 l.	..	16·4 *t*	$\frac{470}{700}$	302
p.v. ”	Denver Des Moines	3200	292	44	17	4135 B. & W.	Philadelphia Quincy, Mass.	1902	1904	212,325	2	..	6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·65	$\frac{470}{700}$	303
scout cr.	*Detroit *Pl.* 44.	7500	550	55	19†	90,000	Quincy, Mass. (Bethlehem)	Bldg.	..	Cost and fee.	..	..	12 *6-in.*, 2 *14-pr.* A.A., 2 *3-pr.*	2 twin.	33·7	Oil.	356
p.v.	Galveston	3200	292	44	17	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	$\frac{470}{700}$	302

scout cr.	*Marblehead	7500	550	55	19†	90,000	Philadelphia (Cramp) .	Bldg.	..	Cost and fee	..	..	12 *6-in.*, 2 *14-pr.* A.A., 2 *3-pr.*	2 twin	33·7	Oil	356
" .	*Memphis . *Pl. 44.*																
.. .	*Milwaukee . *Pl. 44.*	7500	550	55	19†	90,000	Tacoma, Wash.										
"	New Orleans .	3847	346	43¾	19	7500	Elswick	1896	1898	293,684	..	3–1¼ shields	8 *5-in.*, 1 *3-in.* A.A., 2 *3-pr.*, 2 *1-pr.*, 4 M.	..	20·0	512 / 767	366
scout cr.	*Omaha .	7500	550	55	19†	90,000	Tacoma, Wash.	1920	..	Cost and fee	..	..	12 *6-in.*, 2 *14-pr.* A.A., 2 *3-pr.*	twin 2	33·7	Oil	356
" .	*Raleigh .						Quincy, Mass.	Bldg.									
" .	*Richmond . *Pl. 44.*						Philadelphia (Cramp)	1921									
p.v. .	Sacramento .	1425	225	40¾	11½	1022	Philadelphia	1913	1914	101,200	..	..	3 *4-in.*, 2 *3-pr.*, 2 M., 2 l. .	..	12·8 *t*	428	156
scout cr.	Salem . . .	3750	420	47	18¾	22,242 W.T. turb.	Quincy, Mass.	1907	1908	301,000	2–1½	..	4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 2 M.	2 sub.	25·9 *t*	1250 / 1433	356
p.r. .	Tacoma . .	3200	292	44	17	5288 B.&W.	S. Francisco.	1903	1904	212,325	..	2 shields	6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 4 M.	..	16·6 *t*	470 / 700	302
sc. cr. .	*Trenton . . *Pl. 44.*	7500	550	55	19†	90,000	Philadelphia (Cramp) .	Bldg.	..	Cost and fee	..	..	12 *6-in.*, 2 *14-pr.* A.A., 2 *3-pr.*	2 twin	33·7	Oil	356

§ Prices exclusive of armament. † Mean draught.

Aircraft carriers Langley (*ex*-collier Jupiter) and the *ex*-battle-cruisers Lexington and Saratoga. Patrolling and gun vessels Helena, Nashville, Vicksburg, Wheeling, and Wilmington, 1000 to 1392 tons, launched 1895–97; thirteen others and 10 patrolling yachts. About fifty patrol vessels (Eagles) and sixty submarine chasers. Fleet seaplane tender Aroostook and others adapted. Mine-laying vessels Baltimore, San Francisco, and Shawmut, carrying 5-in., and small anti-aircraft guns. A large number of mine-sweepers and tugs. Submarine tenders Alert, Beaver, Bushnell, Camden, Fulton, Chicago, Rainbow, and Savannah. Destroyer depôt ships Black Hawk, Buffalo, Dixie, Dobbin, Leonidas, Meville, Panther, Prairie, and Whitney. Repair ships Topeka, Villalobos, Bridgeport, 7594 tons, Medusa, 10,000 tons, Prometheus and Vestal, 12,595 tons. Supply ships Arctic, Bridge, Rappahanock. Hospital ships Comfort, Mercy, Relief, and Solace. Ulysses and Achilles, colliers, for the Panama Canal. Twelve other colliers and 13 oilers. River gunboats Monocacy and Palos, completed 1914.

Training ships Olympia, 5870 tons; Chicago, 4500 tons. Torpedo experimental vessel Montgomery, 2089 tons.

The ocean liners St. Louis and St. Paul, 11,629 tons, New York and Philadelphia, 10,802 tons, 20 knots (International Navigation Co.), and the Korea and Siberia, 11,200 tons, 18 knots (Pacific Mail Steamship Co.) are enrolled auxiliary cruisers.

SHIPS OF THE LESSER NAVIES.

Austria.—Patrol vessels: Neretva, Compo, Fogas and Poszony.

Belgium.—The maritime affairs of Belgium are under the control of the Minister of National Defence, who is responsible for the administration of the defences by land, sea, and air. The nucleus of the Navy consists of the sloop *ex* Zinnia 16 knots, one 4·7-in. and two 12-prs., for fishery protection duties, and 14 A *ex* German torpedo-boats, of which 11 were interned in Holland and 3 abandoned in November, 1918. Three of these have been named severally Prince Léopold, Prince Charles, and Princesse Marie José.

Bulgaria.—Under the terms of the naval clauses of the Peace Treaty, Bulgarian warships of all classes, existing or under construction, were surrendered to the Allied and Associated Powers or broken up. All vessels are under the Ministry of Commerce for police and preventive duties; torpedo-boats Derzki, Khrabri, Smelyi, and Strogi, with some motor boats.

China.—The naval situation is obscure. The Canton Government was understood to control the light cruisers Cha-Ho (Elswick, 1912, 2,600 tons, two 6-in., four 4-in., eight smaller guns), Hai Chi (Elswick, 1899, 4,300 tons, two 8-in., ten 4·7-in., twenty-two smaller guns), and Hai Chen; the destroyers Chien Kang and Tung An (Elbing, 1912); the gunboats Yung Chien, Yung Hsiang and Yung Peng; torpedo vessel Fei Ying; despatch vessel Wu Feng; river gunboat Chu Yu (No. 2) and the transport Fu An. The following vessels were recently at Amoy: light cruisers Hai Chou and Hai Yeng (Stettin, 1898, 2,954 tons, three 6-in., eight 4-in., twelve machine guns); destroyer Yu Chang; gunboat Yung Chi; despatch vessel Lien Ching and some armed launches. Other vessels are the light cruisers Nan Chen and Ying Jui; torpedo vessels Chien An and Chien Wei; torpedo boats, Chang, Chen, Hu Chun, Hu E, Hu Peng, Hu Yung, Lieh, and Su; river gunboats Che Chen, Che Ting, Chiang Chen, Chiang Ching, Chiang Heng, Chiang Hsi, Chiang Kun, Chiang Li, Chiang Yuan, Chien Chung, Chu Chien, Chu-Kuang, Chu Tai, Chu Tung, Chu Yu (No. 1), Kung Chen, Yung An, Li Chieh, and Li Sui (the two last named *ex* German boats); training ship Tung Chi. The Kuang Tung flotilla recently comprised ten torpedo boats (Lei Chen, Lei Chung, Lei Fu, Lei Kan (No. 1), Lei Kan (No. 2), Lei Ken, Lei Kun Lei Li, Lei Sun, and Lei Tui), but it is doubtful if all are efficient; also gunboats Chen Hang, Chen Tao, Fu Po, Kuang Chen, Kuang

Chin, Kuang Heng, Kuang Li, Kuang Yuan, Lung Hsiang, and two others reported unfit for service; and river gunboats Chiang Ku, Chiang Kung, and Chiang Ta.

Colombia.—Gunboats, Chercinto, Bogota, Cauca, and two guardacostas. River gunboats, General Nerino and Esperanza, 400 tons. Three Yarrow motor gunboats, 1913.

Cuba.—Cruiser, Cuba, 2055 tons, 3500 H.P. 18 knots, and Patria, 1220 tons, 16 knots; also 5 gunboats, 10 submarine chasers and 13 revenue cutters.

Czecho-Slovakia.—There are six patrol ships and certain tugs on river service.

Ecuador.—The torpedo cruiser Libertador Bolivar, mine-laying torpedo boat Tarqui, and special vessel Cotopaxi.

Egypt.—Sloop (*ex* Syringa), 1918, 1310 tons, 17 knots, two 4-in. guns. Nile stern-wheel gunboats Sultan, Sheikh, and Melik, 140 tons, Zafir, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

Esthonia.—With small but efficient naval forces the young Navy of Esthonia gallantly assisted the operations of Sir Walter Cowan, whereby the independence of Esthonia was secured. Rear-Admiral Johan Pitka was in command, and in token of the happy association King George conferred upon that officer the K.C.M.G. The Navy consists of destroyers Wambola (*ex* Kapitan Kingsbergen), 1600 tons, 29 knots, four 4-in. guns, 2 M, 9 T.T., and Lennuk (*ex* Avtroil), 1800 tons, 32 knots, five 4-in. guns, and one 12-pr., 9 T.T., with gunboats, launches and some other vessels, including the *ex* Russian gunboat Bobr, 875 tons, two 4·7-in. and four 12-pr. guns, completed in 1908, which has received the name of Lembit. Five mine-layers, five sweepers, and Peipus Lake gunboats Aliti and Tartu.

Finland.—The Finnish Navy is undergoing some development. The *ex* Russian gunboat Gilyak, 875 tons, two 4·7-in. and four 12-pr. guns, has been transferred to it; patrol boats Klas Horn (*ex* Posadnik), Matti Kurki (*ex* Voevoda), Karjala (*ex* Filin), and Turunmaa (*ex* Orlan); also 3 ex-Russian torpedo boats, and a submarine of little value, a transport, 2 motor boats, 6 ice-breakers, and 3 hospital ships. It has been proposed to acquire 6 *ex* British destroyers.

Hayti.—Special service vessel, 17 December (*ex* s.v. American).

Hungary.—Patrol vessels: Debreczen, Kecskemet, Siofok, Szeged, and 4 others; also 10 motor launches.

Jugo-Slavia.—River monitors on the Danube: Drava (*ex* Enns), Morava (*ex* Körös), Sava (*ex* Bodrog), Varda (*ex* Bosnia). At Cattaro a patrol vessel and 12 *ex* Austro-Hungarian torpedo (F. and T. classes) lightly armed, for police and preventive duties only.

Latvia.—Gunboat Virsaitis (*ex* German M 68.)

Mexico.—Gun-vessels, Tampico and Vera Cruz (Elizabethport, New Jersey, 1902); displacement, 980 tons; armament, four 4-in. Q.F., six 6-pr.; 16 knots; fitted to serve as transports for 200 troops, and Bravo 1200 tons; 2600 I.H.P.; 17 knots (Leghorn, 1904). Training ship Zaragoza, 1200 tons, 1300 H.P., 15 knots, four 4·7-in. and four small Q.F. Two revenue cutters. A small aircraft establishment. On the Pacific side, two gunboats and a transport.

Peru.—Almirante Grau and Coronel Bolognesi, cruisers, 3200 tons; (Barrow, 1906); two 6-in., eight 14-pdr., eight $1\frac{1}{4}$-pdr.; 2 submerged torpedo tubes; 24 knots; also Lima (training.) Gunboat America. Destroyer, Rodriguez, 500 tons, and submarines, Ferré and Palacios, built Le Creusot, 1912–13. Three submarines were building in Italy (Ansaldo). Five river launches, two vedettes, and a small seaplane establishment.

Poland.—The Polish Government hopes eventually to become possessed of a small Navy. The British Naval Mission was withdrawn. It is proposed that Poland shall be allowed six small cruisers and gunboats on the Vistula. She has been allotted six *ex* German torpedo boats for police purposes. Gunboats, Komendant Pilsudski, 500 tons, carrying several small guns, and General Haller built in Finland. Training ship, Lwow. Monitors, Warszowa, Horodyszcre, Pinsk, Morzyrz, and some 15 minor vessels.

Portugal.—The most considerable vessel in the Portuguese Navy is the cruiser Almirante Reis, completed at Elswick in 1899; 4100 tons, 12,000 H.P.; four 5·9-in., eight 4·7-in., fifteen smaller guns, five tubes; 22 knots. The Adamastor, 1962 tons, completed at Leghorn in 1897, and the São Gabriel at Havre in 1899, have as their chief armament, two 5·9-in. and four 4·7-in. guns. Eleven gunboats mainly for Mozambique and Timor. The mine-layer Vulcano was built by Messrs. Thornycroft in 1909. There are other small boats, and several sloops sold out of the British Navy are being added. These are the Republica (*ex* Acacia), and Carvalho Araujo (*ex* Jonquil.) Portugal has the old destroyer Tejo and four

modern, Douro, Guadiana, Vouga, and Tamega (1912–18), 700 tons, 11,000 H.P., 20 knots, two tubes, also five *ex* Austrian F boats for police duties. Submarines Espadarte, 245–300 tons, 13 knots (F.I.A.T.), and Foca, Golfinho, and Hidra (Laurenti); 260–389 tons, 13–8·5 knots, 2 T.T. Seaplane establishments at Belem, Faro and Aviero.

Roumania.—The Black Sea Force comprises the flotilla leaders Marasti and Maracesti, and the torpedo boats Vijelia, Sborul, Naluca, Zmeul, Vartejul, and Viforul, four *ex* French gunboats fitted as mine-layers, and six *ex* Italian motor launches. At Constanza and Sulina are the old protected cruiser Elizabeta, now a hulk, the mine-layer Alexandru-cel-Bun (104 tons), and some tugs; and at Galatz the pilots' school, two river transports and some tugs. The Danube flotilla comprises the monitors Ioan Bratianu, Alexandru Lahovary, Lascar Catargiu, Mihail Kogalniceanu, Besarabia, Bucovina, and Ardeal (600 tons, three 4·7-in guns), seven vedettes, and the yacht Macinul. Seven *ex* Austrian F and T torpedo boats were assigned to Roumania for police duties.

Russia.—The only battleship recently in commission in the Baltic was the former Petropavlovsk (23,000 tons, twelve 12-in. guns) re-named Marat, which flew the flag of the former lieutenant who is in command. The principal forces are destroyers and submarines. The first-class destroyers are the Garibaldi (*ex* Ilyn), Kapt. Izulmetiev, Azard, Samson, Desna, Zabiaka, Pobyeditel, Izyaslav, Novik, Letun, and Orfei, and there are the second-class boats Siberski-Strielok, Likhoi, Lovki, Krepki, and Myetki. The submarines are the Leopard, Tur, Volk, Zmeya, Pantera, Ruis, Tigr, Yaguar, Yersh, Kuguar, and Vipr. The yacht Neva is the leading ship with the flotillas, and three repair ships and the submarine salvage vessel Volhof are attached. Other formations are the mine-sweeping division, transport vessels (6), surveying vessels (3), depôt ships (4), and ice-breakers (7). Recently in reserve, with reduced complements, was the battleship Sevastopol, sister of the Petropavlovsk, now named Paris-Commune, with one mine-layer, two divisions of mine-sweeping trawlers, a flotilla of second-class destroyers, a flotilla of motor boats, and some other vessels. These have now been made ready for sea. Out of commission and unfit for sea are the two other Dreadnoughts, Poltava and Gangut, three older battleships which are to be broken up, six cruisers, nearly all in the same category, and a number of older destroyers, torpedo boats, and submarines, mine-layers and sweepers, patrolling vessels and transports, none of them likely to be of any use. The training service at Kronstadt has the old cruisers Aurora and Diana attached to it,

and other vessels belong to the gunnery, torpedo, and mining schools. There were some manœuvres in September, 1922.

In the Arctic, where a former rear-admiral is in command, the principal force is a destroyer division comprising the Kapitan Yurasovski, Leit. Sergyiev, Bezhumny, and Bestrashny. With the destroyers are the yacht Gorislava, a mine-layer, four motor launches, and some patrol and trawling vessels. In reserve, and probably useless, are the old battleship Chesma, the submarines Kommunist (formerly Sviatoi Georgi) and Delphin, six submarine chasers, and a number of armed auxiliaries, harbour craft, ice-breakers, and patrol boats.

Some progress has been made with naval aircraft, which are based on Oranienbaum, Guteff Island, and Peterhof near Petrograd, and List Nos, near the Finnish border. In all there are about 55 planes, of which 28 are flying boats.

In the Black Sea no battleship is in commission. When Wrangel's forces evacuated Sevastopol on November 14, 1920, his fleet proceeded to Bizerta, where it is under French protection. It is possible that the ships may yet be sold to reimburse the French for their outlay. Some negotiations have been in progress. An account of the proceedings of Wrangel's fleet will be found in the "Annual," 1921–22, pp. 66 and 378. The ships in question are the Dreadnought General Alexeieff (*ex* Alexander III), the pre-Dreadnought Georgi Pobiedonosetz, two cruisers, General Korniloff and Almaz, 6 first-class and 3 second-class destroyers, 4 submarines and some auxiliaries.

The Soviet vessels in commission recently in the Black Sea were two divisions of destroyers, one of them (8 boats) fitted as mine-layers, comprising (1) the Bezposchadni, Bezstrashni, Bezumprechny, Bezshumny, Bravi, Bedovi, Buiny, Bodry; (2) Derzki, Delny, Jutki, Jarki, Jivoi, Jisuchi, Zorky, Zavidny, Prochny, Pronzitelny, Pailky, and Pruitky. There were also two other destroyers, two submarines A. G. 23 (Trotsky) and A. G. 24 (Lunacharsky), and mine-layers, armed vessels, patrol boats, repair ships, transports, etc. In reserve are 6 old battleships, of which all but the Evstafi had their engines destroyed by explosion on April 25, 1919, and also a cruiser, 5 destroyers, 2 submarines, 3 submarine chasing destroyers, large forces of mine-layers and sweepers based on Odessa, 23 motor trawlers, and 9 mine-carriers, 7 patrol boats, 3 ice-breakers, and numbers of armed vessels and auxiliaries. Some additional submarines were sent overland from the Baltic. A small flotilla is on the Dnieper, comprising armed steamers, patrol boats and motor boats.

In the Caspian and on the Volga, with headquarters at Baku, is a force of 14 second-class destroyers, 4 smaller patrolling craft and

colliers and other vessels. In reserve are the submarines Kassatka, Makrel, Minoga, and Okun, some submarine chasers, and mine-sweepers, motor launches and other vessels. In the Far East, at Vladivostok, are some 15 of the older destroyers. On the Amur there remain only about 6 useful river gunboats out of a flotilla of 25.

The Bolshevik aircraft in the Black Sea and the Caspian are based on Sevastopol, Odessa, Nigolaieff, Taganrog, Mariupol, Eisk, Novorissisk, Znzeli, and Baki, and number in all about 36, of which some 17 are said to be flying boats.

Santo Domingo.--The Independencia, built in England 1894, 322 tons, seven Hotchkiss Q.F. Five patrol vessels for revenue service.

Sarawak.—Gunboat Aline and steamboats Lorna Doone and Aden.

Siam.—The gunboats Bali and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2-in., four 1·4-in., 12 knots, launched 1898 and 1901. Three modern despatch vessels 100 to 250 tons. Two 380-ton, 27-knot destroyers, built at Kobe, Sua Gamron Sindhu and Sua Tayanchou. Phra Ruan (*ex* British destroyer Radiant, 1917).

Turkey.—The yachts Ertougrul and Sugutli and a motor launch are at the Sultan's disposal. The gunboats Aidin Reis and Prevese were released by the Allies for patrol duties in the Black Sea, but came under Nationalist control.

Uruguay.—Light cruiser Monte Video, torpedo-cruiser Uruguay, built at the Vulcan Yard, Stettin; 1400 tons; two 4·7-in., four 12-pdr., twelve Maxims; two 18-in. torpedo tubes. Torpedo boat Oriental, yacht 18 de Julio, and some special vessels.

Venezuela.—Marescal Sucre (*ex* Isla de Cuba), drill ship bought from United States, 1912. Gunboats, General Salom, Miranda, José Felix Pribas, Antonio Diaz.

BRITISH AND FOREIGN FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Completed.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
				FLOTILLA LEADERS.									
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Abdiel	Cammell Laird ..	1916											
Grenville													
Seymour..	" " ..	1916	315	31·9	10	3	1610 to 1680	36,000	34	4–4 in. Q.F. 2–2 prs.	4	110 to 116	Oil. 515
Saumarez													
Nimrod	Denny	1917											
Valkyrie	"												
Valorous	"												
Valentine	Cammell Laird	1917	300	29·6	9	2	1320 to 1340	27,000	34	4–4 in. Q.F. 1–3 in. A.A.	4	116	Oil. 367
Valhalla..	" "												
Vampire	J. S. White ..												
Shakespeare	Thornycroft ..	1917											
Spenser	" ..	1917											
Wallace .. .	" ..	1919	318	31·9	10·6	2	1750	43,500	36·5	5–4·7 in. 1–3 in. A.A.	6	164	Oil. 500
Keppel	" ..	Bldg.											
Broke, *ex* Rooke ..	" ..	Bldg.											
Bruce													
Douglas													
Campbell	Cammell Laird ..	1918											
Mackay, *ex* Claverhouse			320	31·9	10·6	2	1800	44,000	36·5	5–4·7 in. 1–3 in. A.A.	6	164	Oil. 500
Malcolm.. . ..													
Montrose	Hawthorn	1918											
Stuart .. .. .. *Pl.* 16.	"	1919											

TORPEDO BOAT DESTROYERS.

"*R*" *Class*:—Rapid, Ready, Retriever, Rosalind, Taurus, Teazer (Thornycroft); Relentless, Rival, Sabrina, Sybille, Truculent Tyrant (Yarrow); Radstock, Raider, Sorceress, Torrid, Tower (Swan, Hunter); Redgauntlet, Rob Roy, Rocket (Denny); Redoubt, Umpire (Doxford); Restless, Rigorous, Romola, Rowena, Simoom, Skate, Tarpon, Telemachus (John Brown); Salmon, Sylph, Skilful, Springbok, Tenacious, Tetrarch (Harland and Wolff); Sable, Trenchant (White); Sarpedon, Starfish, Stork, Thisbe, Thruster (Hawthorn); Satyr, Sharpshooter, Tancred, Ulster (Beardmore); Sceptre, Sturgeon, Tormentor (Stephen); Tempest, Undine (Fairfield); Urchin, Ursa (Palmer); Ursula (Scotts).

Displacement, 883–1040 tons; length, 260–265 ft.; 26,500–27,000 H.P.; speed, 35–36 knots; armament, three 4-in., one 2-pdr., four torpedo tubes; fuel, 256–300 tons; complement, 82.

"*S*" *Class*:—Sabre, Saladin, Sardonyx (Stephen); Scimitar, Scotsman, Scout, Scythe, Seabear, Seafire, Searcher, Seawolf (John Brown); Senator, Sepoy, Seraph, Serapis, Serene, Sesame (Denny); Shamrock, Shikari (Doxford); Shark, Sparrowhawk, Splendid, Sportive, Tilbury, Tintagel (Swan, Hunter); Steadfast, Stirling, Stormcloud (Palmers); Strenuous, Stronghold, Sturdy, Swallow (Scotts); Tactician, Tara (Beardmore), Tenedos, Thanet, Thracian, Turbulent (Hawthorn); Torbay, Toreador, Tourmaline (Thornycroft); Tribune, Trinidad, Trojan, Truant, Trusty (White); Torch, Tomahawk, Tumult, Turquoise, Tuscan, Tyrian (Yarrow); Sirdar, Somme, Spear, Spindrift, Sikh (Fairfield).

Displacement, 885–1090 tons; length, 260–265 ft.; 27,000 H.P.; speed, 36 knots; armament, three 4-in., one 2-pdr., six torpedo tubes; fuel, 250–300 tons; complement, 90.

"*V*" *Class*:—Vancouver, Vanessa, Vanity (Beardmore); Vanoc, Vanquisher (J. Brown); Vectis, Vortigern (White); Vega, Velox (Doxford); Vendetta, Venetia (Fairfield); Venturous (Denny); Verdun, Versatile (Hawthorn); Vesper, Vidette (Stephen); Viceroy, Viscount (Thornycroft); Violent, Vimiera (Swan, Hunter); Vivacious, Vivien (Yarrow).

Displacement, 1275–1300 tons; length, 300 ft.; H.P., 27,000–30,000; speed, 34–35 knots; armament, four 4-in., one 3-in., four torpedo tubes; fuel, 367 tons; complement, 110.

"*W*" *Class*:—Voyager (Stephen); Wakeful, Watchman, Venomous, Verity, Veteran (J. Brown); Walker, Westcott, Volunteer (Denny); Walpole, Whitley (Doxford); Walrus, Wolfhound, Wanderer (Fairfield); Warwick, Wessex (Hawthorn); Westminster (Scotts); Wolsey, Woolston, Wishart, Witch (Thornycroft); Vansittart (Beardmore); Winchelsea, Winchester, Witherington, Wivern, Wolverine, Worcester (White); Whirlwind, Wrestler, Whitehall, Whitshed, Wild Swan (Swan, Hunter); Waterhen, Wryneck (Palmers); Wren (Yarrow).

Displacement, 1275–1350 tons; length, 300 ft.; H.P., 27,00 ; speed, 34 knots; armament, four 4-in., or four 4·7-in., and one 3-in.; six torpedo tubes; fuel, 365 tons; complement, 127.

SLOOPS.

Of the large number of sloops which were built during the War for patrol and other duties only about twenty now remain in the Post-War Fleet, some in commission abroad and others for subsidiary and training duties in home waters.

Names are as follow: Bluebell, Bryony, Camellia, Clematis, Cornflower, Chrysanthemum, Crocus, Cyclamen, Daffodil, Delphinium, Foxglove, Godetia, Harebell, Heather, Heliotrope, Hollyhock, Laburnum, Lily, Lupin, Magnolia, Snapdragon, Valerian, Verbena, Veronica, Wallflower, Wistaria. Also Petersfield (*ex* mine-sweeper).

Displacement, 1250 tons; length, 255 ft.; H.P., 2400; speed, 17 knots; armament, two 4-in., two 3-pdrs.; 260 tons of coal; complement, 93.

TWIN-SCREW, MINE-SWEEPERS.

The following are retained in the Post-War Fleet:—

Alresford, Carstairs, Caterham, Sherborne, Mistley, Burslem, Truro, Badminton, Tring, Leamington, Albury, Caerleon, Camberley, Dorking, Dundalk, Dunoon, Elgin, Faversham, Fermoy, Ford, Forres, Gaddesden, Gainsborough, Gretna, Irvine, Kendal, Lydd, Mallaig, Malvern, Marlow, Meynell, Munlochy, Nailsea, Newark, Northolt, Pangbourne, Prestatyn, Ross, Rugby, Saltash, Saltburn, Selkirk, Shrewsbury, Stafford, Sutton, Swindon, Tiverton, Tonbridge, Tralee, Weybourne, Yeovil.

Most of the foregoing form a "Central Reserve of Twin-Screw Mine-sweepers." In addition, the following are employed on surveying duties:—

Beaufort, Collinson, Fitzroy, Flinders, Kellet.

Displacement, 800 tons; length, 220 ft.; H.P., 2200; speed, 16 knots; armament, one 3-pdr.; 140 tons of coal; complement, 74.

PATROL BOATS.

The following are retained in the Post-War Fleet:—

P 31, P 38, P 40, P 46, P 47, P 48, P 52, P 59, PC 43, PC 56, PC 60, PC 70, PC 71, PC 72, PC 73, PC 74.

Displacement, 573 tons; length, 230 ft.; H.P., 4000; speed, 22 knots; armament, one 4-in., one 2-pdr., two 14-in. tubes; oil, 93 tons complement, 54.

SUBMARINES.

"*E*" *Class*:—E 23, E 27, E 31, E 32, E 33, E 35, E 38, E 41, E 42, E 45, E 46, E 48, E 53, E 55.

Surface displacement, 660 tons, submerged, 800; surface H.P., 1600, submerged, 840; surfacee speed, 15 knots, submerged, 10 knots oil, 45 tons; armament one 3-in., five 18-in. tubes; complement, 30.

"*G*" *Class*:—G 4, G 10, G 13.

Surface displacement, 700 tons, submerged, 975; surface H.P., 1600, submerged, 840; surface speed, 14 knots, submerged, 10 knots; oil, 44 tons; armament, one 3-in., four 18-in., and one 21-in. tubes; complement, 30.

"*H*" *Class*:—H 21, H 22, H 23, H 24, H 25, H 26, H 27, H 28, H 29, H 30, H 31, H 32, H 33, H 34, H 43, H 44, H 47, H 48, H 49, H 50, H 51, H 52.

Surface displacement, 440 tons, submerged, 500; surface H.P., 480, submerged, 320; surface speed, 13 knots, submerged, 10½ knots; oil, 16 tons; armament, four 21-in. tubes; complement, 22.

"*K*" *Class*:—K 2, K 6, K 8, K 12, K 14, K 22. Building, K 26.

Surface displacement, 1880 tons, submerged, 2650; surface H.P., 10,000, submerged, 1400; surface speed, 24 knots, submerged, 9 knots; oil, 200 tons; armament, one 4-in., one 3-in. A.A., eight 18-in. tubes; surface propulsion by steam turbines; complement, 54.

"*L*" *Class*:—L 1, L 2, L 3, L 4, L 5, L 6, L 7, L 8, L 9, L 11, L 12, L 14, L 15, L 16, L 17, L 18, L 19, L 20, L 21, L 22, L 24, L 25, L 33, L 52, L 56, L 71. Building, L 23, L 26, L 27, L 53, L 54, L 69.

Surface displacement, 890 tons, submerged, 1070; surface H.P., 2400, submerged, 1600; surface speed, 17½ knots, submerged, 10½ knots; oil, 76 tons; armament, one 3-in. or 4-in., six 18-in. tubes. (L 52 and later boats have two 4-in. guns each.); complement, 38.

"*M*" *Class*:—M 1, M 2, M 3. Details not published. One 12-in. gun; complement, 65.

"*R*" *Class*:—R 1, R 2, R 3, R 4, R 7, R 8, R 9, R 10, R 11, R 12.

Surface displacement, 420 tons, submerged, 500; surface H.P., 1200, submerged 240; surface speed, 15 knots, submerged, 9½ knots; oil, 13 tons; complement, 22.

"*X*" *Class*:—X 1. Building at Chatham.

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	27·4 *t.*	1 14-pr.	3	54	80
Missiones..	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr,	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*	Q.F., 2 M.	3	54	80
Catamarca, Jujuy ..	Germania ..	1911	286·7	27·1	8·6	2	940	18,000	32	4 4-in.	4	110	300
Cordoba, La Plata ..	Schichau ..	1911	279	29·6	7·3	..	890	19,000	34·7	4 4-in.	4	110	340
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
2 boats	Yarrow ..	1890	130	13·5	6·0	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para		1908						7,014	27·25				
Amazonas		1908						6,898	27·17				
Piahuy		1908						6,563	27·21				
Matto Grosso		1908						7,403	27·16				
Parahyba..		1909						6,700	27·29				
Rio Grande do N. ..	Yarrow ..	1909	240	23·6	10	2	550	7,778	27·27	2 4-in., 4 3 prs.	2	..	140
Alagoas		1909						7,403	27·25				
Santa Catharina ..		1909						6,982	27·30				
Parana		1910						8,877	28·74				
Sergipe		1909						8,554	27·60				
FIRST CLASS—													
Goyaz	Yarrow ..	1907	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..
SUBMARINES—													
F 1, 3, 5	Muggiano (Fiat)	1914	150	14	9·8	..	250–375	..	14–8·5	..	2	..	..

Five additional destroyers and three submarines are in the programme.

Six *ex*-enemy torpedo-boats were allotted to Brazil, to be used for police purposes. A Laurenti submarine salvage and testing vessel, named Ceará, 3800 tons, 328 ft. long, 59 ft. beam, 14 knots.

2 B

Chile.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Almirante Lynch, Condell..	White.. ..	1912, 1913	320	32·6	11·1	3	1850	27,000	31·7	6-4-in. 2 M.	4	..	507
Almirante Riveros (*ex*-Broke) .. Almirante Uribe (*ex*-Faulknor) .. Almirante Williams (*ex*-Botha)	White ..	1914	320	32·6	11	3	1700 to 1740	30,000	31·5	2-4·7-in., 2-4-in., 1 6-pr.	4	160	486
Capitan Orella ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Muñoz Gamero..	Laird	1896	210	21·6	5·4	2	300	6,000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·35	1-12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6,000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Jarpa .. .. .. Capitan O'Brien ..	Laird	1901	210	21·6	5·4	2	350	6,000	30	Do.	2	65	90
Captain Thompson..	Armstrong .	1902	..	..	..	2	480	5,600	28	6-6 pr.	2	83	90
First Class—													
Injeniero Hyatt, Cirujano Videla, Ing. Mutilla Rodriguez	Yarrow ..	1896, 1898	152·6	15·3	7·9	1	140	2,200	27·5–27·2	3-3 pr. Q.F.	3	28	40

Six submarines (Holland type) built for the British Government in 1915 were ceded to the Chilian Navy in 1917. They are numbered H 1 to H 6; 450–520 tons, 960–620 H.P., 13–11 knots, length 150 feet, 1 gun, 4 T.T.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Havkatten, Sælen .. Nordkaperen .. .. Makrelen .. .. .. Narhvalen .. .. Havhesten, Söhunden Sölöven, Stören .. Springeren	Royal Dockyard, Copenhagen	1919, 1918, 1918, 1917, 1917, 1916, 1916	126·3	13·9	8·4	2	108·5	2,000	24·6	2 6-pr. A.A.	2	22	15
Ormen	Royal Dockyard, Copenhagen	1907	124·6	14·3	8·6	1	105	2,100	26	2 1-pr.	3	21	11
Sværdfisken .. .. Delfinen, Hvalrossen	Royal Dockyard, Copenhagen	1913, 1913	148·2	16·9	7·5	2	190	3,480	26·2	1 6-pr.	4	30	28
Söulven .. .. .. Flyvefisken .. .. Söridderen	Burmeister, Copenhagen; Yarrow & Co.	1911, 1911, 1911	181·7	18	9·7	2	275	5,000	27·5	2 12-pr.	5	33	55
Spaekhuggeren .. Vindhunden .. .. Tumleren..	Royal Dock., Copenhagen; Schichau	1911	184·8	19·1	7·1	2	300	5,000	27·5	2 12-pr.	5	34	49

Three old torpedo boats rebuilt, 1902–8.

Submarines—Bellona, Flora, Rota, 301–369 tons, 1 2·2-in. A.A., 4 T.T. Galathea, Neptun, Triton, Ran, Ægir, 185–235 tons, 13·5 9·8 kts., 1 2·2-in. A.A., 3 T.T. Nymfen, Najaden, Havfruen, Havmanden, Thetis, An den 2 April, 167–204 tons, 13·5 8 kts., 2 M., 2 T.T.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Bouclier	Normand ..	1911	237·0	24·9	9·4	3	790	13,000	35·33	2-25-pr.4-9pr.	4	62	160
Carquois	Rochefort ..	1907	197·4	21·5	11·4	2	347	6,800	28·15	19-pr.6 3-prs.	2	62	37
Casque	Havre(F.&C.)	1910	246·4	25	10·0	3	820	14,400	34·90	2 25pr.,4-9pr.	4	62	160
Cavalier	Normand ..	1910	222·0	21·8	10·5	3	527	8,600	31·19	4–9 prs.	2	62	150
Cimeterre	Bordeaux ..	1911	253·4	28·7	10·0	2	894	13,500	31·15	2-25pr.,4-9pr.	4	62	160
Claymore	Normand ..	1906	196·8	21·6	11·4	2	339	7,600	30·45	1-9pr. 6-3prs.	2	62	75
Fanfare	Normand ..	1907	197·0	21·7	11·5	2	361	6,600	28·0	1-9pr. 6-3prs.	2	62	84
Glaive..	Rochefort ..	1908	197·4	22·4	11·8	2	358	6,800	27·90	1-9pr. 6-3prs.	2	62	75
Lansquenet	Bordeaux ..	1909	216·0	20·8	10·0	3	542	8,129	28·8	6–9 prs.	3	62	150
Mameluck	Nantes ..	1909	197·2	22·8	10·0	2	407	7,750	30·5	6–9 prs.	3	62	150
Massue	Toulon ..	1908	197·4	21·7	11·4	2	350	7,128	28·4	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort ..	1906	185	21·5	11·3	2	347	6,800	29·5	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort ..	1909	189	22	11	2	358	6,800	28	1-9pr. 6-3prs.	2	62	75
Sape	Rouen ..	1907	224	21·7	11·5	2	350	6,400	30	1-9pr. 6-3prs.	3	..	..
Spahi	Havre.. ..	1908	207	21·7	10	2	455	9,000	29·4	6–9 prs.	3	62	120
Trident	Rochefort ..	1907		21·5	11	2	347	6,800	28·1	1-9pr. 6-3prs.	2	62	37
Com. Bory, Francis Garnier, Com. Rivière, Capt. Mehl, Deborter (5) ..	Normand, &c.	1912	253·6	25·4	10·0	3	780	14,100	31	2 3·9-in., 4 9 prs.	4	81	120
Bisson .. .. Protet, Magon, Comm. Lucas, Mangini (4) ..	Toulon, etc.	1912 & 1913	272·4	26	10·0	3	800	15,000	31	2 3·9-in., 4 9 prs.	2 dbl.	81	120
Enseigne Henry, Aspirant Herbert (2)	Rochefort ..	1911 & 1912	221	21·6	10·3	2	475	7,500	28·5	6–9 prs.	3	62	50
Ens. Roux, M. P. Lestin, Ens. Gabolde (3)	Rochefort & Normand	1915–1920	271	26·9	10·0	2	880	20,000	31	2 3·9-in., 4 9 prs.	3 dbl.	81	..
TORPILLEURS D'ESCADRE—													
Téméraire, Intrepide, Opiniatre, Aventurier	Nantes ..	1911	270	..	..	..	950	18,000	..	4 3·9 in.	4	..	..
Annamite, Algérien, Arabe, Bambara, Hova, Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg ..	Japan	1917	272	24	7·10	..	685	10,000	29	1–4·7 in., 4–12 prs.	2 dbl.	..	..
SEA-GOING—													
Mistral	Normand ..	1901	153	17	8·8	2	186	4,018	28·2	2–3 prs.	3	..	23
Simoun	Havre ..	1901	152·7	17	9	2	186	4,600	27·7	2–3 prs.	3	..	18
Siroco	Normand ..	1901	152·7	17	9	2	186	4,300	28·7	2–3 prs.	3	..	23

Six destroyers and 12 torpedo-boats are in the programme.

The following ex-enemy destroyers: Rageot de la Touche (*ex* H 146), Delage (*ex* H 147), 900 tons, 33·3 knots; Chastang (*ex* S 133), Vesco (*ex* S 134), Mazaret (*ex* S 135), Deligny (*ex* S 139), 910 tons, 33·7 knots; also Buino, Pierre Durand, and Matelot Leblanc.

TORPEDO BOATS.—The following are the numbers of the existing torpedo boats (86-100 tons) built 1899–1906. It has been decided that many of them shall not be taken in hand for any extensive refit. All of them will soon disappear: 243, 268, 310, 315, 316, 318, 321, 327, 328, 330, 332, 336, 337, 339, 349, 360, 368, 369.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.
			Feet.	Feet.	Feet.		Tons.		Knots.			
SUBMARINES—												
Nivôse, Brumaire, Frimaire	Cherbourg ..	1907 to 1912	170·8	18·0	10·3	2	398	700	9¾–12½	..	7	24
Euler, Franklin, Faraday, Volta, Newton, Arago, Curie, Le Verrier	Cherbourg .. Rochefort .. Toulon ..	1909 1912	160	16·4	13·6	2	398	340	7¾–12½	..	7	24
Clorinde, Cornélie, Amphitrite, Astrée, Artémis, Aréthuse, Atalante, Amaranthe, Andromaque	Rochefort ..	1913 1916	174	16·9	10·9	2	410	1,300	15·8	..	8	20
Néréide	Cherbourg ..	1913	243	19·8	14·4	2	787–1000	4,800	10–20	..	8	40
Bellone, Hermione, Gorgone	Rochefort .. Toulon ..	1914 & 1915	198·9	17·7	11·9	2	520	1,800	17	..	8	29
Daphne..	Cherbourg ..	1915	223	18·0	12·0	2	633	1,800	15·1	1-75mm., 1 M.	10	..
Joessel, Fulton	Cherbourg ..	1917	243	20·0	13·4	2	870	..	16·8	2-75mm., 1 M.	10	..
Laplace .. .. Lagrange, Regnault .. Romazzotti	Rochefort .. Toulon .. Toulon ..	1917 1917 1918	247	21·0	13·0	2	840	..	16·5	,, ,,	10	..
Amazone, Antigone ..	Schneider ..	1918	184·6	17·0	10·6	2	665–467	2,000	17·5	1-2 pr., 1 M.	6	..
Regnault, O'Byrne, L. Dupetit-Thouars, Henry Fournier, Dupuy de Lôme	Chalons ..	1919 & 1920	172	15·6	9·6	..	335–502	1020–460	8·14	1 gun ..	4	..
Paul Chailley	Havre	1920	246	..	..	..	866–1171	1800–1400	13·5–85	1-12 pr., 2 M. 64 mines	4	..
Maurice Callot	Bordeaux ..	1920	246	..	..	..	861–1211	2900–1600	17–10	1-12 pr., 2 M. 64 mines	4	..
Roland Morillot (*ex*-U.B. 26)		1916	118·6	15	12	..	250–290	280–240	8·5–6	..	4	..

Ten other German submarines surrendered have been embodied in the French flotilla and have received the following names: Jean Roulier, Pierre Marast, Halbronn, René Audry, Léon Mignot, Jean Autric, Victor Reveille, Jean Corre, Carissan and Trinité Schillémans. All were built in 1917–1918, and are large boats of great range (7000–10,000 miles), with four or six torpedo tubes, and one or more 4-in. guns. The V. Reveille is a mine-layer (36 mines).

Twelve submarines are in the programme of 1920.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Thyella .. .. Sphendoni .. .. .. Lonchi	Yarrow ..	1906	220	20·6	6·0	2	400	6000	31·79 31·84 32·53	2 12, 4 6-pr.	2	70	80
Smyrna (*ex* Austrian Ulan	Trieste	1907	220	20	6·6	2	400	6000	27	4 11-pr., 2 11-pr., A.A.	2	86	90
Nike.. . .. .. Aspis .. .. .. Velos	Stettin (Vulcan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80
Aetos, Leon, Panthir, Jerax ..	Birkenhead	1911	285	29·9	9·6	..	980	19,750	32	4 4-in.	4	110	225
SUBMARINES—													
Delphin, Xiphias ..	Chalon sur Saône ..	1911–12	164	..	..	..	300–460	..	14·9	..	5	..	..

Six 125-ton torpedo-boats built by the Vulcan Co. at Stettin: Arethusa, Doris, Aigli, Dafni, Alcyon, Thetis, 25 knots.

The surrendered Austrian torpedo-boats: Pergamos, 92 F, 94 F, Proussa, 99 M and 100 M, 250 tons, have been added to the Greek Navy for police duties. The destroyer Naikratousa was wrecked in 1921, and the Keravnos and Nea Genea have been sold.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Euro	Schichau	1900	197	21·5	8·5	2	320	5,600	31	4 14-pr.	4	50	60
Aquilone	Naples (Pattison)	1901	210	19·4	7·6	2	330	6,000	30	4 14-pr.	4	53	60
Zeffiro Turbine	Naples (Pattison)	1904	210	19·4	7·6	2	330	6,000	30	4 14-pr.	3	53	60
Bersagliere Artigliere Granatiere Lanciere Alpino Corazziere Pontiere Carabiniere Fuciliere	Genoa (Ansaldo)	1906 1907 1909 1910	211·6	20·0	7·6	2	365	6,000	30	4 14-pdr.	3	55	82
Impavido Indomito Insidioso Irriquieto	Naples (Pattison)	1912 & 1913	246	24·6	7·6	2	650	15,000	35·2	5 4-in., 2 2-pr., A.A.	2	..	100
Ardito Ardente Animoso	Orlando (Leghorn)	1912 & 1913	246	24·6	7·6	2	650	15,000	35·5	5 4-in., 2 2-pr., A.A.	2	..	..
Ascaro	Ansaldo	1912	211·5	20·0	6·6	2	380	6,000	29	2 14-pr. 4 6-pr.	3	..	80
Enrico Cosenz Antonio Mosto Giuseppe Sirtori Francesco Stocco Giovanni Acerbi Vincenzo Orsini Giacinto Carini Rosolino Pilo Giuseppe Abba Simone Schiaffino G. Dezza Giuseppe Missori Ippolito Nievo	Naples (Pattison) Genoa (Odero)	1913 & 1914	238	24	8·9	2	770	18,000	33	6 4-in., 2 2-pr., 2 M. Carry also 10 mines	2 dbl.	100	170
Giuseppe La Masa Angelo Bassini Nicola Fabrizii Giacomo Medici Fratelli Cairoli Giuseppe la Farina Gen. A. Cantore Gen. A. Chinotte Gen. A. Papa Gen. A. Cascino	Genoa (Odero)	1917 & 1918	238	24	9·0	2	770	18,000	33	4 4-in., 2 14-pr., 2 M. Carry also 10 mines	2 dbl.	100	170
Audace	Yarrow	1918	275	27·6	8·3	2	922	21,500	36	1 4-in. 6 3-in.	2 dbl.	111	252
Ardimentoso, *ex*-S. 63		1915	274	27·3	8·6	2	908	25,000	31·5	3 4·1-in.	6	..	305
Solferino, Palestro S. Martino, Curtatone Confienza, Castelfidardo	Leghorn (Orlando)	1920 1921	270	26	12	2	930	15,500	32	4 4-in., 2 12 pr., A.A.	4	..	..
Alessandro Poerio Gulielmo Pape	Genoa (Ansaldo)	1914	279	2·65	9·3	2	1012	20,000	32	6 4-in., 4 2-pr., A.A.	2 dbl.	100	400
Cesare Rossarol, *ex*-German B97	Hamburg	1917	321	30·9	9·9	2	1354	40,200	37·5	4 4-in., 24 mines	6	..	..
First Class—													
Sirio, Sagittario Spica Alcione, Ardea Albatros, Airone Astore, Arpia Orione, Orfeo	Elbing Odero	1905-6 1905 1906	167	19·8	5·0	2	210	2,900 3,200	26	2 14-pr., A.A.	3	40	40
Pegaso Procione Pallade Cigno Cassiopea Calliope Clio Canopo Calipso Climene	Naples (Pattison) Naples (Pattison) Naples (Pattison)	1905 1905 1906 1907 1906 1907 1907 1909 1909	164	17·4	7·0	2	200	3,000	25·4 26·6	2 14-pr., A.A.	3	..	40
P.N., 1–4, 6–12, 33–38, 40–45, 69 A.S., 26, 29, 31, 32, 50–57 O.S., 13–16, 18–25, 27, 28, 30, 47–49, 51	Pattison Ansaldo Odero	1912 & 1913 1914	139	13·9	5·5	2	130	2,500	27	1 6-pr.	2	..	15
O.L., 58-65 O.L.T., 74, 75	Orlando Orlando	1916 1920	139	13·5	5·5	2	157	3,000	27–29	2 12-pr.	2	..	25
R.M., 39	Cantiere												
C.P., 76–79	Palermo	Bldg.											
F. Rismondo, *ex* Austrian T.B. 11		1910	142	14	..	2	110	2,400	28	2 3-pr.	2	..	..

Under construction are the Calatafimi, Monzambano, 930 tons (Orlando, Leghorn), of the Solferino class. Gen. Montanari, Gen. Prestinare, and four others of the La Masa class, 800 tons, are being built by Odero, Sestri Ponente.

Seven *ex* Austrian destroyers were added, as follows: Cortellazzo, Fasana, Grado, Monfalcone, Muggia, Pola, Zenzon, built at the Danubius yard, Fiume, 1912-1916, 850 tons.

Italy—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINES—													
L. Galvani, E. Torricelli, P. Micca .. L. Mocenigo .. .. L. Marcello .. .. A. Emo .. .. .. A. Barbarigo .. .. A. Provana .. .. S. Veniero .. .. G. Nani	Spezia.. .. Venice.. .. Spezia, F.I.A.T.	1917 1919	207·5 218·0	20·3 19·0	15·6 15·6	.. ..	830/1000 740/920	2600	15-9·5 17-9·2	2 14-pr. A.A.	6	..	..
X 2, 3	Ansaldo ..	1917	139·9	18	11	..	400/460	660/320	9·2-6·3	1 12-pr. 18 mines	..	..	..
H 1 to 4, 6 to 8 ..	Vickers ..	1917	15·0	16	12	..	360/440	960/980	12-8·9	1 12-pr.	4	22	..
F 1, 2, 5, 6, 7, 9, 10, 12–21	F.I.A.T. .. Odero .. .. Orlando ..	1913 1917 1918	148	14	10	..	260/380	700/320	13-8·5	1 12-pr. A.A.	2	..	12
F. *ex* Argonauta ..	Ansaldo ..	1913	148·3	13·9	9-1	..	250/300	700/250	13-9	1 12-pr. A.A.	2	..	..
N 1 to N 6	..	1917 1918	150	14	9-9	..	270/350	700/250	13·6-8	1 12-pr. A.A.	2	..	..

Four submarines, 600 tons submerged, are in the new programme.

Japan.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Shirakumo, Asashio	Thornycroft	1901–2	216·7	20·7	6·0	2	373	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asagiri, Murasame, Kagero	Yokosuka ..	1902	220·3	20·6	6·0	2	374	6,000	29	2 12-pr., 4 6-prs.	2	..	..
Hatsushima, Yayoi, Kisaragi, Hibiki, Wakaba, Hatsuyuki, Kamikaze, Ariake	Yokosuka ..	1905–6	220·3	20·6	6·0	2	374	6,000	29	6 12-pr.	2	..	..
Fubuki, Arare, Udzuki .. .. Yunagi, Oite .. .. Asakase, Harukase Shigure, Hatsuharu Yuguri, Yudachi .. Mikadzuki, Nowake Shiranuhi, Usugumo Uschio, Nenohi .. Shiratsuyr, Hayate	Yokosuka .. Maizuru .. Kobe .. .. Sasebo.. .. Kure .. .. Nagasaki ..	1905–6	220·3	20·6	6·0	2	374	6,000	29	6 12-pr.	2	..	..
Shirayuki, Matsukase Asatsuyu, Hayakase Kikutsuki, Minatsuki Nagatsuki, Utsuki.. Isonami, Uranami.. Ayanami	Nagasaki .. Osaka .. .. Uraga .. .. Yokosuka ..	1906–10	220·3	20·6	6·0	2	374	6,000	29	6 12-prs.	2	70	90

Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Sakura, Tashibana..	Kure	1912	288·0	..	7·3	3	600	18,000	30	1 4·7-in. 4 12-pr.	4	..	..
Kaba	Yokosuka ..	1915	260·0	24·0	7·9	3	665	9,500	30	1 4·7 in. 4 12-pr.		..	..
Kaede	Maizuru ..												
Kashiwa	Nagasaki ..												
Katsura	Kure												
Kiri	Uraga												
Kusunoki	Kawasaki ..												
Matsu	—												
Sakaki	Sasebo.. ..												
Sugi	Osaka												
Ume	Kawasaki ..												
Momo, Yanagi ..	Sasebo.. ..	1916–17	275·0	25·0	7·9	..	835	16,000	31·5	3 4·7 in., 2 M.	6	..	..
Kashi, Hinoki ..	Maizuru ..												
Nara..	Yokosuka ..	1917–18	275·0	25·0	7·9	..	835	16,000	31·5	3 4·7 in., 2 M.	6	..	..
Kuwa, Tsubaki ..	Kure												
Maki, Keyaki	Sasebo.. ..												
Yenoki	Maizuru ..												
Momi, Take	Maizuru, etc.												
Nashi, Kaki													
Kaya, Kure													
Nire, Tsuga													
Umikaze, Yamakase	Maizuru ..	1909–11	310·0	..	9·0	..	1200	20,500	33	2 4·7-in., 5 12-pr.	4	123	..
Urakaze	Yarrow ..	1915	275·3	27·6	7·11½	2	955	22,000	28	1 4·7-in., 4 12 pr.	4	..	..
Amatsukaze	Kure	1916	310·0	28·0	9·3	..	1227	27,000	34	4 4·7-in.	6	..	..
Tokitsukaze	Kawasaki ..												
Isokaze	Kure												
Hamakaze	Nagasaki ..												
Tanikase, Minekase	Maizuru ..	1916–19	320	29	9·5	..	1300 1350	28,000	34	4 4·7-in., 2 M.	6	..	..
Kawakase	Yokosuka ..												
Sawakase..	Mitzubishi..												
Okikase, Shimakase, Nadakase, Yakase, Hakase	Maizuru ..												
Suzukase, Soyokase, Sumujikase, Makase, Okase, Namikase, Numakase, Nokase, Tashikase, Shiokase, Hokase, Yukase, Akikase	Kawasaki, Yokosuka, etc.	1921 and Bldg.	320	29	9·5	..	1345	38,500	36	4 5·5-in. or 5 4·7-in.	6	..	..

To be completed in 1922, twenty-five second-class destroyers, 900 tons, 33 knots, 4 or 6 T.T.: Susuki, A-oi, Kiku, Fuji, Yanogi, Warabi, Tade, Tsuta, Hishi, Sumure, Ashi, Hasu, Shion, Nadeahiko, Botan, Ajesai, Yuri, Ayami, Omodaka, Karukayo, Kikyo, Tsutsuji, Basho, Kaido, Kakitsubata. About twenty others of the same class are planned, as also sixteen of the powerful "Kase" class, reported to displace 1900 tons and to mount 4·7-in. guns, with 3, 4, or 6 T.T.

Torpedo-boats: Kamone, Kiji, Otori, Shirataka.

SUBMARINES.—The oldest Japanese submarines date from 1904–5, when five were purchased from the Fore River Company, U.S.A. The Japanese began to build in the following year, and two boats were supplied by Vickers in 1908. Thirteen boats had been completed before the war, and the Kawasaki Company added two in 1919, provided with four T.T. All these are small vessels, designed for local employment. Their highest surface speed is 14 knots. One sea-going submarine dates from 1914, and has surface displacement of 670 tons and 17 knots speed, with six T.T. and range of 2200 miles. Ten others have since been completed, the displacement rising to 1000 tons and the range to over 7000 miles. Each of these mounts a small gun, and has four or five T.T. The later boats are of Laurenti type, and have been built by the Kawasaki Company. It is expected to complete about thirty additional boats in 1921–23. The surface displacement is increased to about 1250 tons or more, and the range extended to 11,000 miles. It is stated that the surface speed is 17 knots, that some of the boats carry a 5·5-in. gun, and have from four to six T.T., and that some are fitted as mine-layers. The Japanese sea-going submarine flotilla should thus comprise over forty boats. About thirty others are building and projected, including several of the cruiser type.

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Wolf, Fret (1909) .. Bulhond, Jakhals (1910) Hermelijn, Lynx, Pauter, Vos (1911)	Flushing ..	1910–1913	230	20·6	9	2	480	7,500	30	4 2·9-in. semi-aut. 4 M.	2	84	80
FIRST CLASS—													
Zeeslang, Krokodil, Draak, Hydra ..	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
G 13–15–16	Scheldt .. Fijenoord ..	1914	165	17·3	9·5	..	188	2,000	26	2 12-pr.	3dbl	..	..
Z 1–4..	Amsterdam	1916–1917	201	20·4	6	2	322	5,500	27	2 12-pr., 2 M.	2 1dbl	42	53
Z 5–8..	Scheldt .. Fijenoord ..	1915	192	30	5, 6	2	310 322	5,500 5,700	27 27	2 12-pr., 2 M.	2 1dbl	42	81

The named destroyers and first-class boats belong to the forces of the Dutch Indies. The other torpedo-boats are in Holland.

SUBMARINE boats.—O 1 (*ex*-Luctor et Emergo), O 2 and 3, 132–150 tons, 11·8 knots, 2 tubes. O 4 and 5, 380 tons, 151 ft. 6 in. long, 16 knots (surface), 11 knots (submerged) speed. O 6 and 7, built in Holland, 178–234 tons. British interned submarine bought by the Dutch Government and taken over as O 8, June, 1917; O 9–11 building. M 1 submarine mine-layer. K submarines for the East Indies: K 1, 320–380 tons, 3 tubes; K 2–7, 560–700 tons, 1 2·9-in.; 1 M., 6 tubes, 16·10 knots; K 8–10, 570–700 tons, 1 3·4-in., 1 M., 6 tubes: Nos. 9 and 10 not completed.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Draug, Troll, Garm	Horten ..	1908–13	226	25·0	..	2	540	7,500	27·0	6 12-pdrs.	3	71	95
FIRST CLASS—													
Snoegg, Stegg, Trygg	Horten ..	1919–1920	175	18	5½	2	220	3,500	25	2 12-pdr.	4	31	29
SECOND CLASS—													
Hval, Delfin	Elbing ..	1896–	130·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in.Q.F.	2	19	17
Storm, Brand, Trods	Horten ..	1900	128·0	15·0	..	1	84	1,100	23	2 1·4-in.Q.F.	2	19	17
Laks,Sild,Sael, Skrei	Horten ..	1901	128·0	15·0	6·9	1	84	1,100	23	2 1·4-in.	2	19	17
Kjek, Hvas, Dristig, Kvik, Djerv, Blink, Lyn, Hauk, Falk, Glimt	Fredrikstad Horten ..	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Horten ..	1906–7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	2–3	18	16
Ravn, Orn	Horten ..	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	16	15
Kjeld..	Horten ..	1912	135	14·9	6·4	1	100	1,800	25	1 12-pr.	3	19	16
SUBMARINES—													
A 1, 2, 3, 4	Germania Kiel	1909 to 1913	131·6	14·9	9·6	2	220 255	440 250	12 9	..	3	17	..
MINING VESSELS:—													
Froeya	Horten ..	1917–	250	27	8½	2	755	..	22	4 4-in.	2	80	95
Glommen, Laugen..	Christiania..	1918	138	28	6½	2	335	350	9·5	2 12-pdr.	..	39	21

Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Terror, Audaz.. ..	Clydebank ..	1896 / 1897	220 / 229	22	9·9	2	300	6,000 / 7,950	29	4 2½-pr. 2 / 6-pr.21-pr.	2	74	100 / 93
Osado, Proserpina ..	Clydebank ..	1897	229	22	9·9	2	457	7,500	30	2 14-pr. 2 / 6-pr.2 1-pr	2	74	90
Bustamente .. .. / Villamil .. .. .. / Cadarso	Cartagena .. / Cartagena .. / Cartagena ..	1913–1915	220	22	5·6	..	364	6,250	28	5 6-pr.	2	..	..
TORPEDO BOATS—													
22 boats	Cartagena ..	1913 & Pro.	164	16·5	4·9	3	177	3,750	26	3 3-pr.	3	..	..

Three destroyers are in hand at Cartagena: 1140 tons, 34 knots, turbines, 33,000 h p., three 4-in., two 12-prs., 4 tubes. Three others are in the programme. Torpedo boat No. 21 has been completed at Cartagena, where No. 22 is in hand.

In September, 1917, three submarines (A 1, 2 and 3), built in Italy, were delivered (260-383 tons. 700–500 h.p., 13–8·5 knots, two tubes), and six others building (one completed and in service), 610–740 tons, 17–10·5 knots, two 12-pr., 6 T.T., will give Spain a flotilla of ten boats, the tenth being the Peral (500–685 tons, 17–10·5 knots, one 12-pr., 4 tubes).

Sweden.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fue Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Mode	Yarrow .	1902	220·3	20·6	8·9	2	480	6,800	32·4	1 12-pr. / 5 6-prs.	2	55	95
Magne	Thornycroft	1905											
Wale..	Malmo ..	1906											
Ragnar	Malmo ..	1909											
Sigurd	Gothenburg	1909	216·9	20·8	8·2	2	480	7,200	30·0	2 12-prs. / 4 6-prs.	2 dbl.	63	90
Vidar	Malmo ..	1909											
Hugin	Gothenburg	1909											
Munin	Malmo ..	1910											
Wrangel .. .. .. / Wachtmeister.. ..	Gothenborg	1918	230	22	8·2	2	500	..	30·0	2 12-prs., / 6 4-prs.	2 dbl.	..	..
TORPEDO-BOATS—													
Plejad, Castor, Pollux	Normand & Carlskrona	1905–1909	125	14·4	6·6	1	106	1,900	26	2 1·5-in. Q.F.	2	18	20
Vega .. .. / Vesta	Carlskrona..	1909	128	14·4	8·6	1	105	1,900	25	2 6-prs.	2	18	20
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	1909	128	17·5	8·6	1	120	1,900	25	2 6-prs.	2	18	20
Altair .. .. .. / Antares .. .. .. / Argo .. .. .. / Arcturus	Stockholm ..	1908	128	17·5	8·6	..	110	2,000	25	2 6-prs.	2	18	20
Perseus, Polaris .. / Regulus, Rigel ..	Bergsund .. / Stockholm ..	1910–1915	128	14·4	8·6	1	115	2,000	25	2 6-prs.	2	18	20

Also ten small torpedo-boats, 60 tons, built 1907–1908.

Submarines: Delfinen (1915), 250–370 tons, 15–9 knots, one machine-gun, two T.T.; Aborren, Gaeddan (1915), Vabrossen, Illen, Uttern, Saelen, Braken, Laxen, Tumlaren, Svaerdfisken (1916–18), 250–370 tons. Second class, Hajen and Nos. 1–4. Details of the Swedish submarines are given under reserve. The facts are confidential. The new programme (1922–24) includes additional submarines.

United States

The Destroyers of the United States Navy are now classified, like the big ships, as of the first or second line. There are now 285 of the former and 21 of the latter. The following are the second line boats, and have a maximum speed of 30 knots:—

Paulding, Drayton, Roe, Terry, Perkins. Sterett, McCall, Burrows, Warrington, Mayrant, Monaghan, Trippe, Walke, Ammen, Patterson, Fanning, Jarvis, Henley, Beale, Jouett, Jenkins (21 boats). These are likely to be removed from the list.

These boats are 289 ft. long, with 26-ft. beam, 8-ft. 4-in. draught, 742 to 900 tons displacement, 11,000 to 12,000 H.P., speed 20 to 30 knots, five 3-in. guns, three 18-in. twin torpedo-tubes, fuel 210 tons, complement 89 ; built 1910–11.

The first line destroyers in the succeeding lists date from 1913 onward, and mark the approach to better sea-keeping qualities, and the introduction of a bigger gun and more powerful torpedo armament. Their displacements rise from 1020 to 1215 tons, their engine-power from 15,300 to 27,000, and their speed from 30 to 35 knots.

The first named of the 35-knot boats is the **Ringgold**. All these destroyers mount four 4-in. guns, and the later boats have each two 1-pr. A.A. guns.

With the **Hart** the calibre of these last guns is increased to 3 in., but the latest boats, from the **Clemson** onward, carry only one A.A. gun.

With regard to torpedo armament the first eight boats in the following list, **Cassin** to **Balch**, have each three 18-in. twin tubes, but in most of the others the diameter is increased to 21 in., and in the boats built from the **Sampson** onward, that is, after the fortieth boat, a system of triple tubes has been installed. All these boats are from 300 ft. to 310 ft. long, with beam of 30 ft. 4 in. to 31 ft., and mean draught of about 9 ft. 4 in. They have a maximum fuel capacity of 300 tons, and complement of 98. The series is as follows:—

Cassin, Cummings, Downes, Duncan, Aylwin, Parker, Benham, Balch, O'Brien, Nicholson, Winslow, McDougal, Cushing, Ericsson, Tucker, Conyngham, Porter, Wadsworth, Wainwright, Sampson, Rowan, Davis, Allen, Wilkes, Shaw, Caldwell, Craven, Gwin, Conner, Stockton, Manley, Wickes, Philip, Evans, Little, Kimberley, Sigourney, Gregory, Stringham, Dyer, Colhoun, Stevens, McKee, Robinson (44 boats), 1916–18.

Ringgold, McKean, Harding, Gridley, Fairfax, Taylor, Bell, Stribling, Murray, Israel, Luce, Maury, Lausdale, Mahan, Schley, Champlin, Mugford, Chew, Hazelwood, Williams, Crane (21 boats), 1918–19. Seven of these are mine-layers.

Hart, Ingraham, Ludlow, Rathburne, Talbot, Waters, Dent, Dorsey, Lea, Lamberton, Radford, Montgomery, Breese, Gamble, Ramsay, Tattnall, Badger, Twiggs, Babbitt, De Long, Jacob Jones, Buchanan, Aaron Ward, Hale, Crowninshield, Tillman, Boggs, Kilty, Kennison, Ward, Claxton, Hamilton, Tarbell, Yarnall, Upshur, Greer, Elliot, Roper, Breckinridge, Barney, Blakeley, Biddle, Du Pont, Bernadou, Ellis, Cole, J. Fred Talbot, Dickerson, Leary, Schenck, Herbert, Palmer, Thatcher, Walker, Crosby, Meredith, Bush, Cowell, Maddox, Foote, Kalk, Burns, Anthony, Sproston, Rizal, Mackenzie, Renshaw, O'Bannon, Hogan, Howard, Stansbury, Hopewell, Thomas, Haraden, Abbot, Bagley (76 boats), 1919–20. Many of these are mine-layers.

The following are all new 35-knot boats: Clemson, Dahlgren, Goldsborough, Semmes, Satterlee, Mason, Graham, Abel P. Upshur, Hunt, Welborn C. Wood, George E. Badger, Branch, Herndon, Dallas, Chandler, Southard, Hovey, Long, Broome, Alden, Smith Thompson, Barker, Tracy, Borie, John D. Edwards, Whipple, Parrott, Stewart, Hatfield, Brooks, Gilmer, Fox, Kane, Humphreys, McFarland, James K. Paulding, Overton, Sturtevant, Childs, King, Sands, Williamson, Reuben James, Belknap, McCook, McCalla, Rodgers, Ingram, Bancroft, Welles, Aulick, Turner, Gillis, Delphy, McDermut, Laub, McLanahan, Edwards, Greene, Ballard, Shubrick, Bailey, Thornton, Morris, Tingey, Swasey, Meade, Sinclair, McCawley, Moody, Henshaw, Meyer, Doyen, Sharkey, Toucey, Breck, Isherwood, Case, Lardner, Putnam, Worden, Flusser, Dale, Reid, Chauncey, Fuller, Percival, John Francis Burnes, Farragut, Somers, Stoddert, Reno, Farquhar, Thompson, Kennedy, Paul Hamilton, William Jones, Woodbury, S. P. Lee, Nicholas, Young, Zeilin, Yarborough, La Vallette. Sloat, Wood, Shirk, Kidder, Selfridge, Marcus, Mervine, Chase, Robert Smith, Mullany, Preston, Lamson, Litchfield, Zane, Wasmuth, Trever, Hulbert, Noa, William B. Preston, Preble, Tillman, Pillsbury, Ford, Truxton, Paul Jones, King, Williamson, Bainbridge, Goff, Barry, Hopkins, Lawrence, Coghlan, Hull, McDonogh, Fahrenholt, Sumner, Perry, Decatur, Converse, Dale, Billingsley, Osborne, Bruce, Charles Ausburne, Edsall, MacLeish, Simpson, Bulmer, McCormick, Corry, Melvin, Crane, Pope, Peary, Sicard, Pruitt (161 boats).

Submarines.

The submarine flotillas are as follows:—

D 1, 2, 3.	1909.	278-340 tons. Harbour defence	3
F 2, 3.	1914–15.	325-400 tons, 14-9½ knots	2
G 1, 3, 4.	1914–15.	695-965 tons, 15½-9½ knots	3
H 2 to 9.	1914–15.	440–515 tons, 12–10½ knots	8
K 1 to 8.	1916.	1880-2650 tons, 24-9½ knots	8
L 1 to 11.	1916–17.	890-1080 tons, 17½-10½ knots, 4 T.T.	11
M 1.	1918.	740 tons, 14–11 knots	1
N 1 to 7.	1918–19	331-385 tons, 4 T.T.	7
The following are the first line boats:—			
O 1 to 16.	1918–19	500–625 tons, 4 T.T., 1 3-in., 14–11 knots	16
R 1 to 27.	1918–19.	569–680 tons, 13½–10½ knots, 4 T.T. (coastal)	27
S 1 to 4, 6 to 51.	900–1126 tons.	All these are new boats, many of them not yet completed	50
Fleet submarines.		1106–1487 tons, 8 T.T., 2 1-in., 2 13-pr. (3 T class completed, 3 V class building, six not yet contracted for.) Some of these are believed to have a submerged displacement of 2025 tons, and a surface speed of 21 knots	12

The list makes a total of 148 boats, but probably 40 or more have yet to be completed.

PLANS

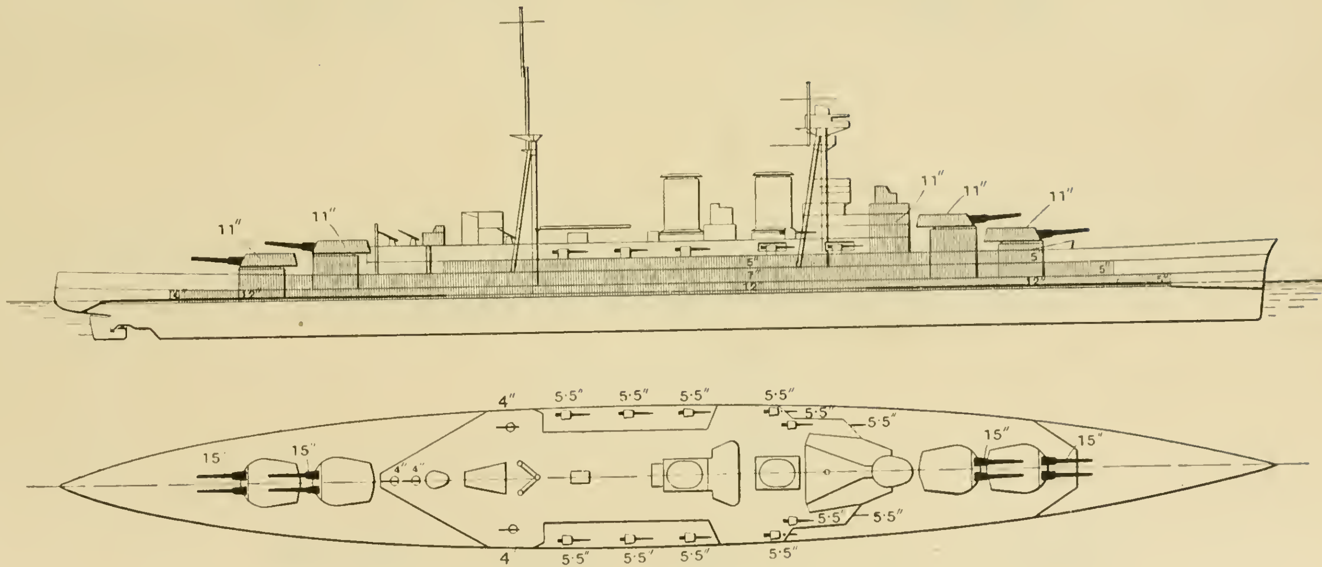
OF

BRITISH AND FOREIGN WARSHIPS.

GREAT BRITAIN.

BATTLESHIP.

Hood.

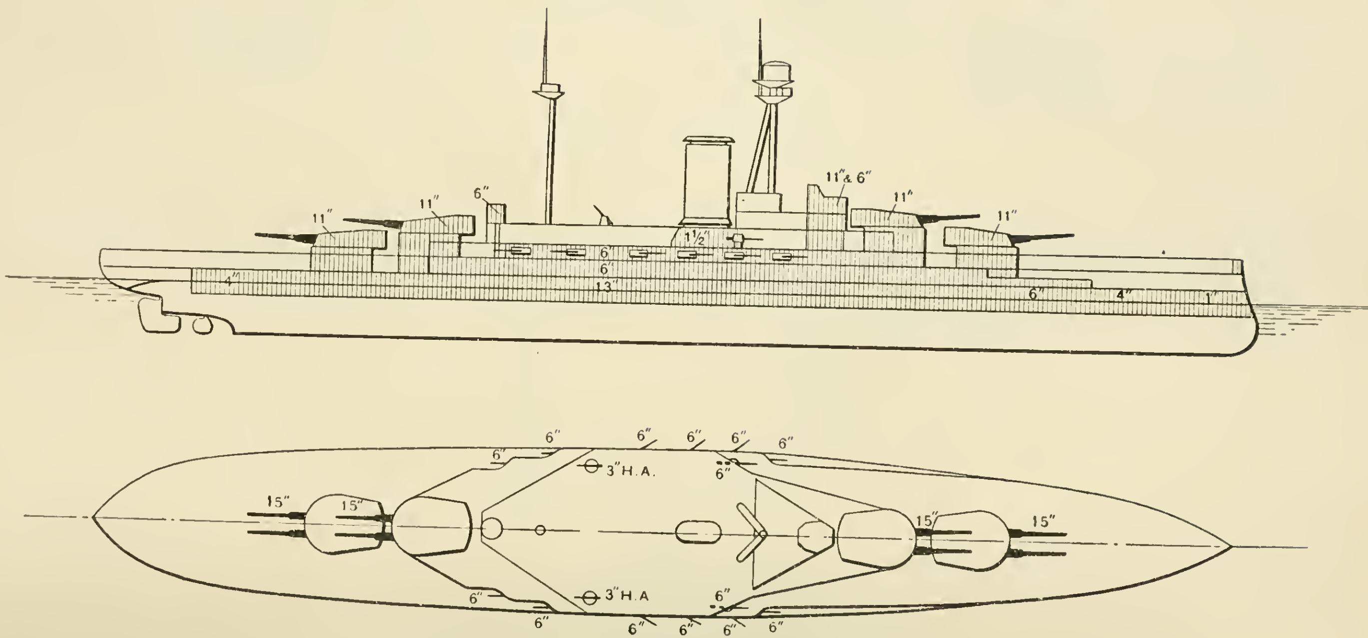


Length, 810 ft.; 41,200 tons Speed, 31 knots; Completed, 1920.
Armament, 8—15 in., 12—5·5 in., 4—4 in. H.A., 4—3 pdr.

GREAT BRITAIN

BATTLESHIPS.

Royal Sovereign, Royal Oak. Revenge. Resolution. Ramillies.

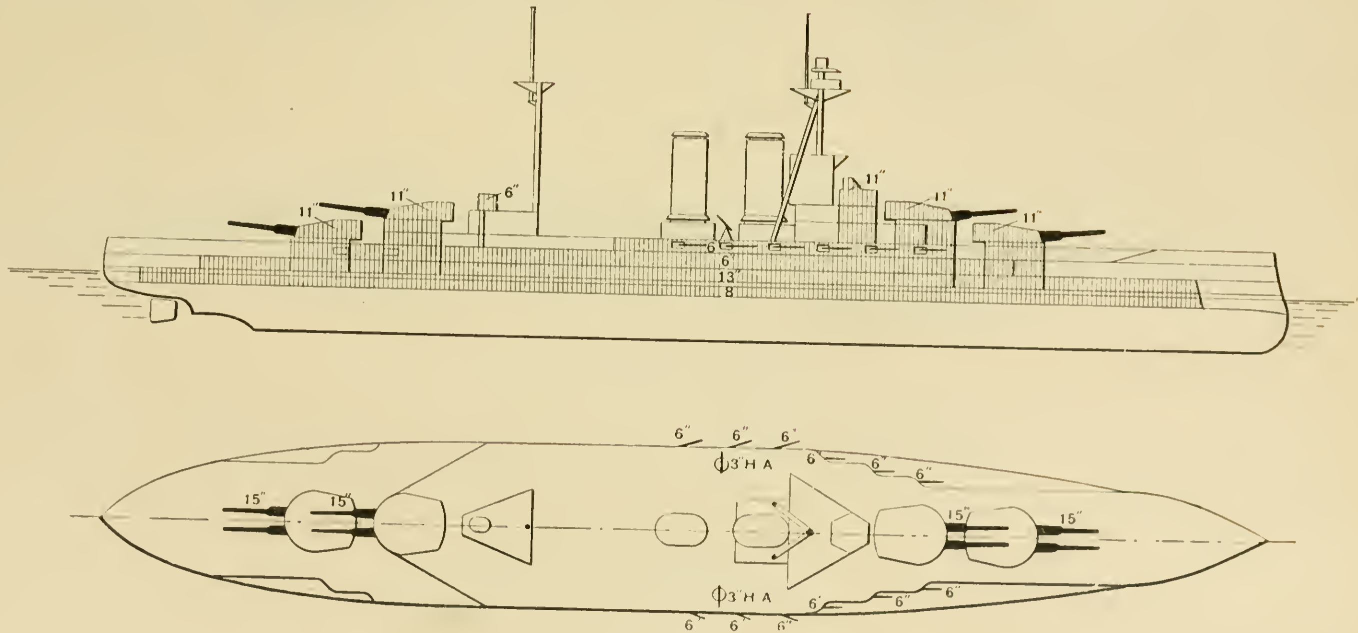


Length, 580 ft. ; 25,750 tons ; Speed, 23 knots ; Completed, 1916–7.
Armament, 8—15 in., 14—6 in., 2—3 in. H.A., 4—3 pr.

GREAT BRITAIN.

BATTLESHIPS.

Queen Elizabeth. Warspite. Barham. Valiant. Malaya.

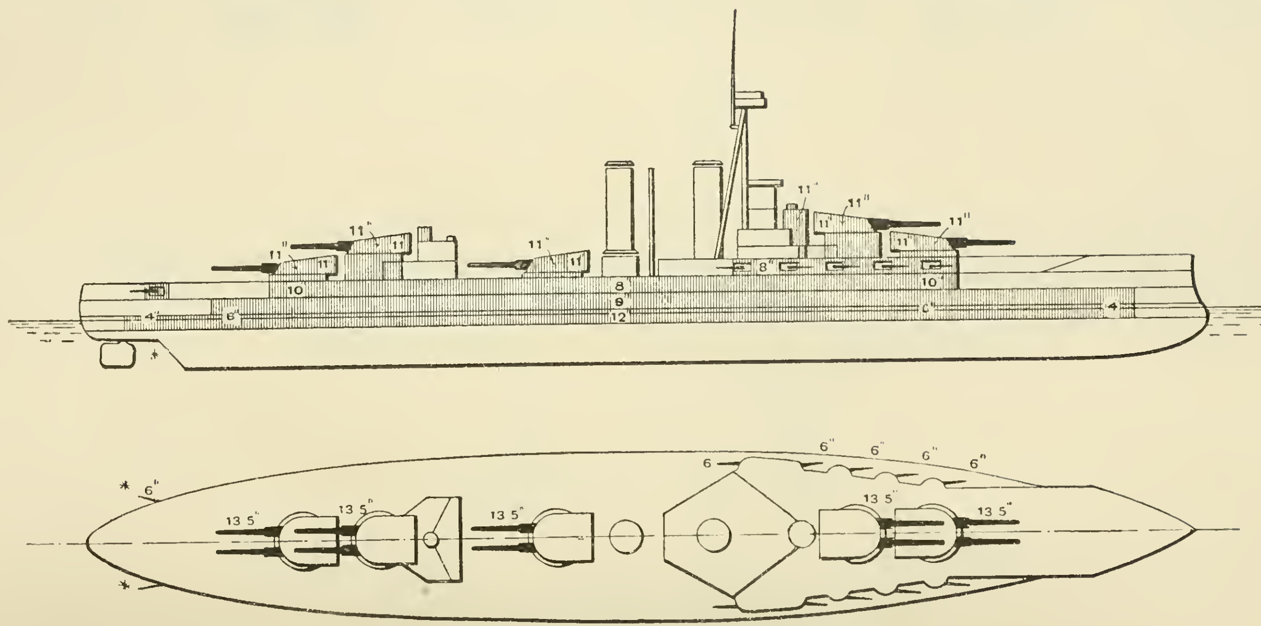


Length, 600 ft. ; 27,500 tons ; Speed, 25 knots ; Completed, 1915-1916 ;
Armament, 8—15 in., 12—6 in. 2—3 in. H.A., 4—3 pr., 5 M.

GREAT BRITAIN.

BATTLESHIPS.

Iron Duke. Marlborough. Benbow. Emperor of India.



Length, 580 ft.; 25,000 tons; Speed, 21-22 knots;
Armament, 10—13·5 in., 12—6 in., 2—3 in. A.A., 4—3 pr.

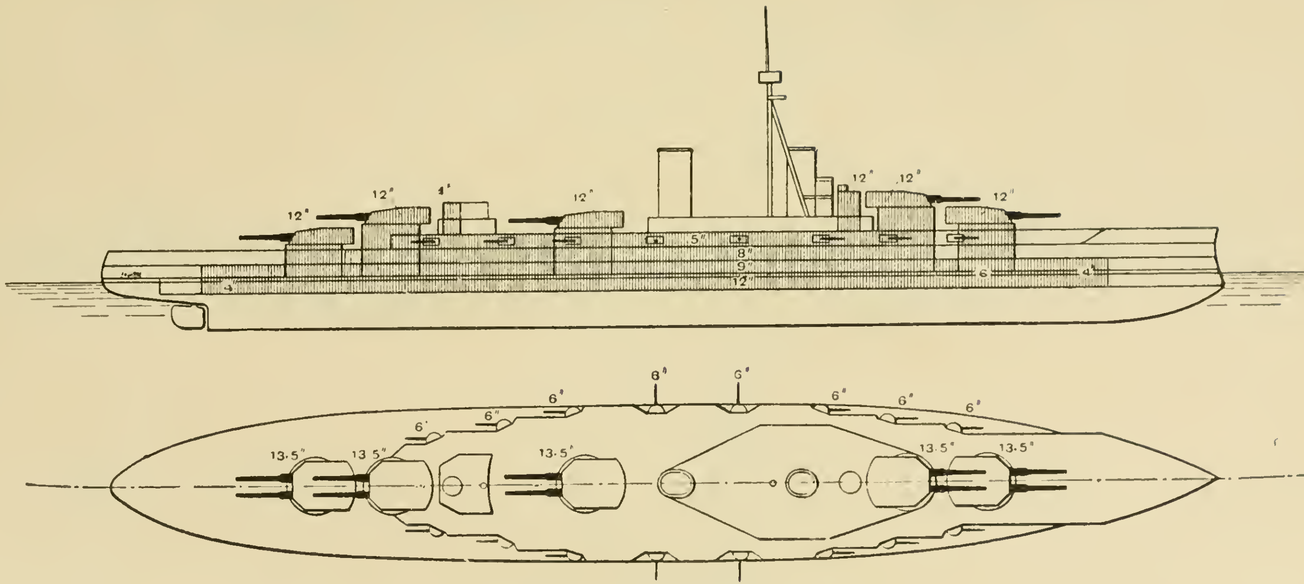
* These two guns have been removed to a position on forecastle abreast foremost funnel.

Plate 4.

GREAT BRITAIN.

BATTLESHIP.

Erin (*Ex* Reshadieh).

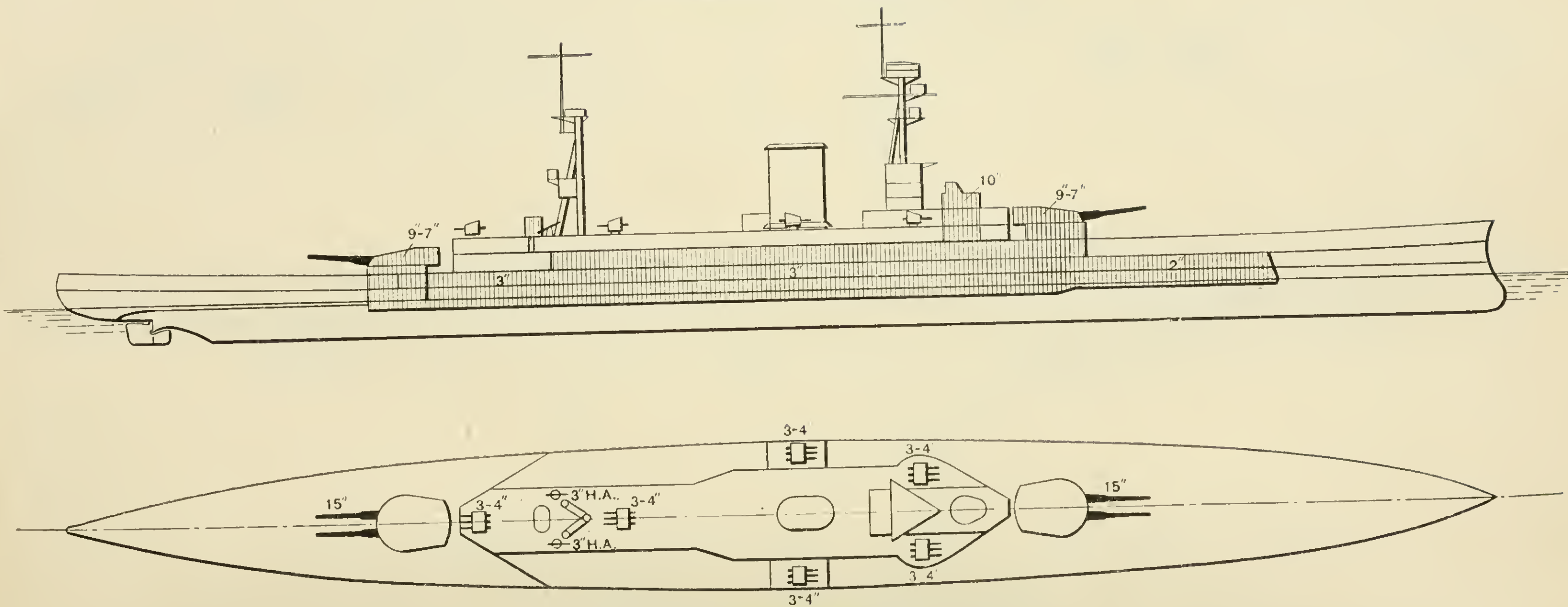


Length, 525 ft. ; 22,940 tons ; Speed, 21·5 knots.
Armament, 10—13·5 in., 16—6 in, 2—3 in. H.A., 4—6 pr.

GREAT BRITAIN.

LARGE LIGHT CRUISERS.

Courageous. **Glorious.**

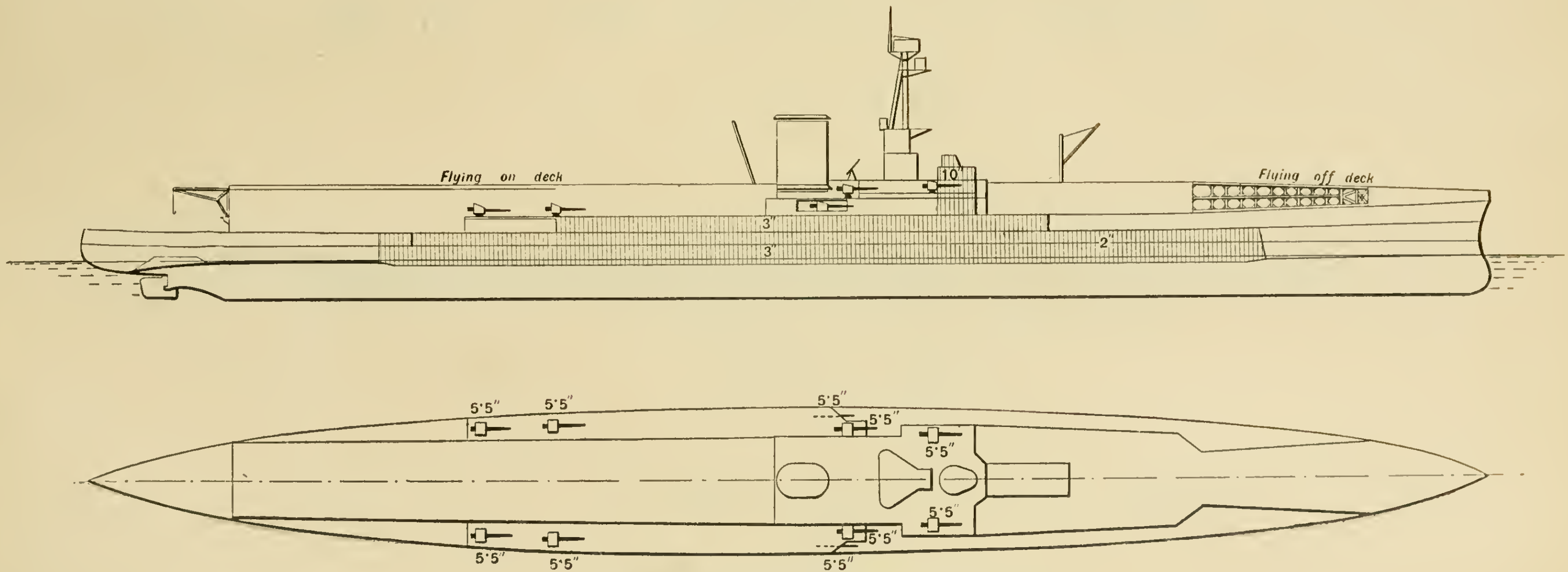


Length, 735 ft.; 18,600 tons; Speed, 32 knots; Completed, 1916;
Armament, 4—15 in., 18—4 in., 2—3 in. H.A., 19 M.

GREAT BRITAIN.

LARGE LIGHT CRUISER.

Furious.
(Seaplane Carrier.)

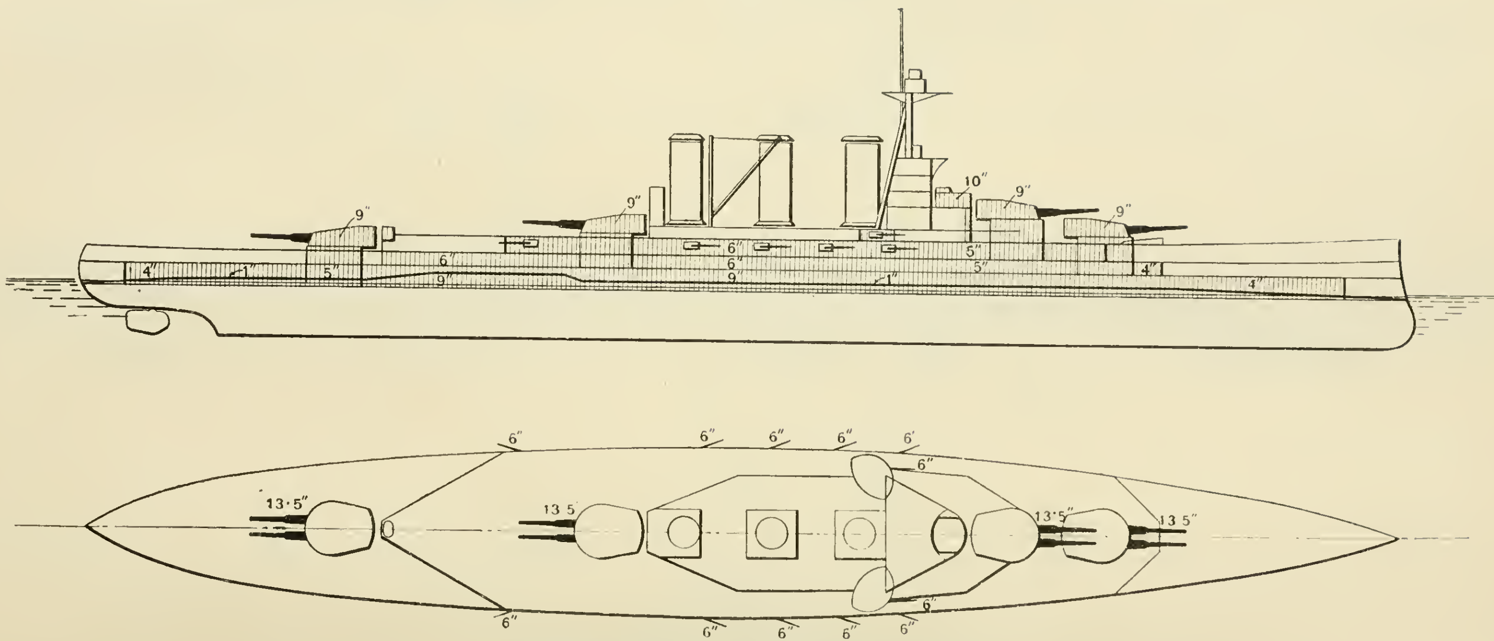


Length, 735 ft.; 19,100 tons; Speed, 31 knots; Completed, 1917;
Armament, 10—5·5 in., 5—3 in. A.A., 2-3 pr.

GREAT BRITAIN.

BATTLE-CRUISER.

Tiger.

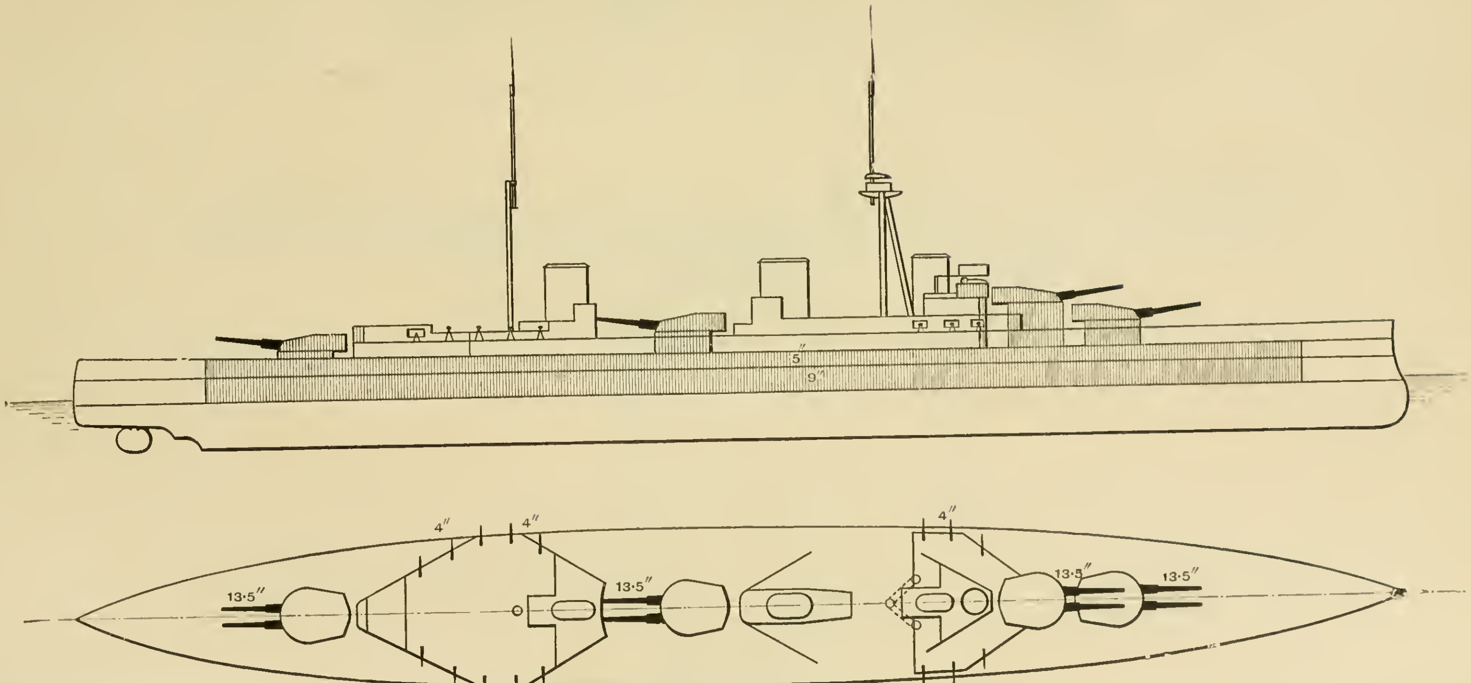


Length, 660 ft. ; 28,500 tons 30 knots ; Completed, 1914 ;
Armament, 8—13·5 in. ; 12—6 in., 4—3 pdr., 5 M., 2—3 in. H.A.

GREAT BRITAIN.

BATTLE CRUISERS.

Lion. Princess Royal.

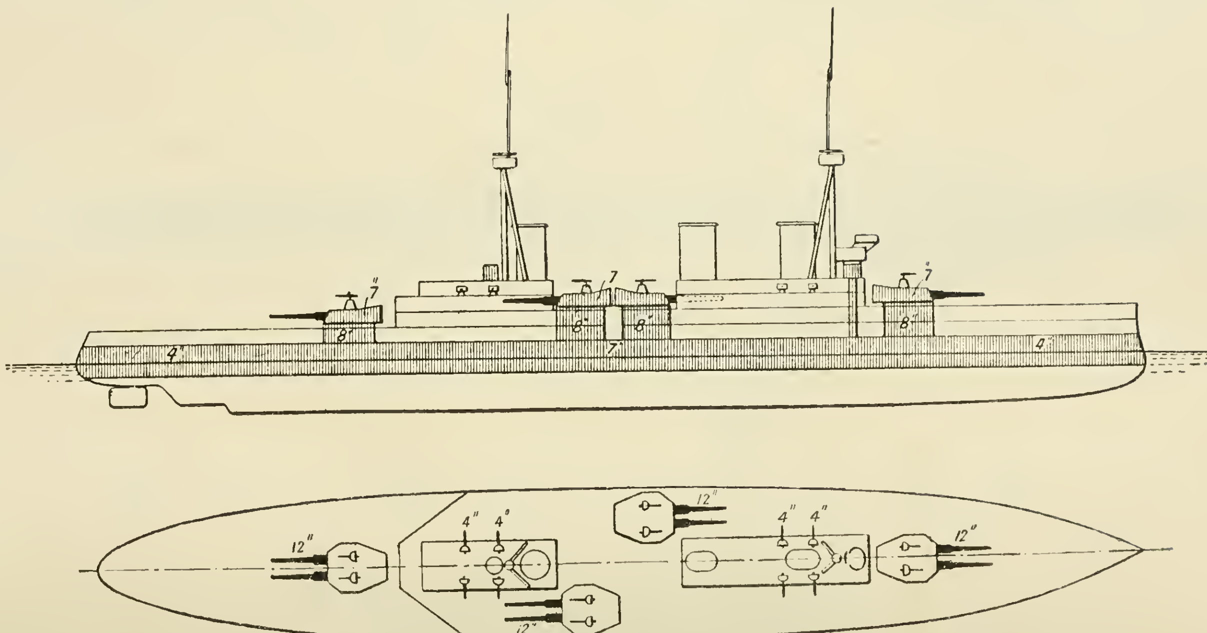


Length, 660 ft. ; 26,350 tons ; Speed, 28-28·5 knots ; Completed, 1912-13 ;
Armament, 8—13·5 in., 16—4 in., 4—3 pr., 5 M., 2—3 in. H.A.

GREAT BRITAIN.

BATTLE CRUISERS.

New Zealand. Australia.



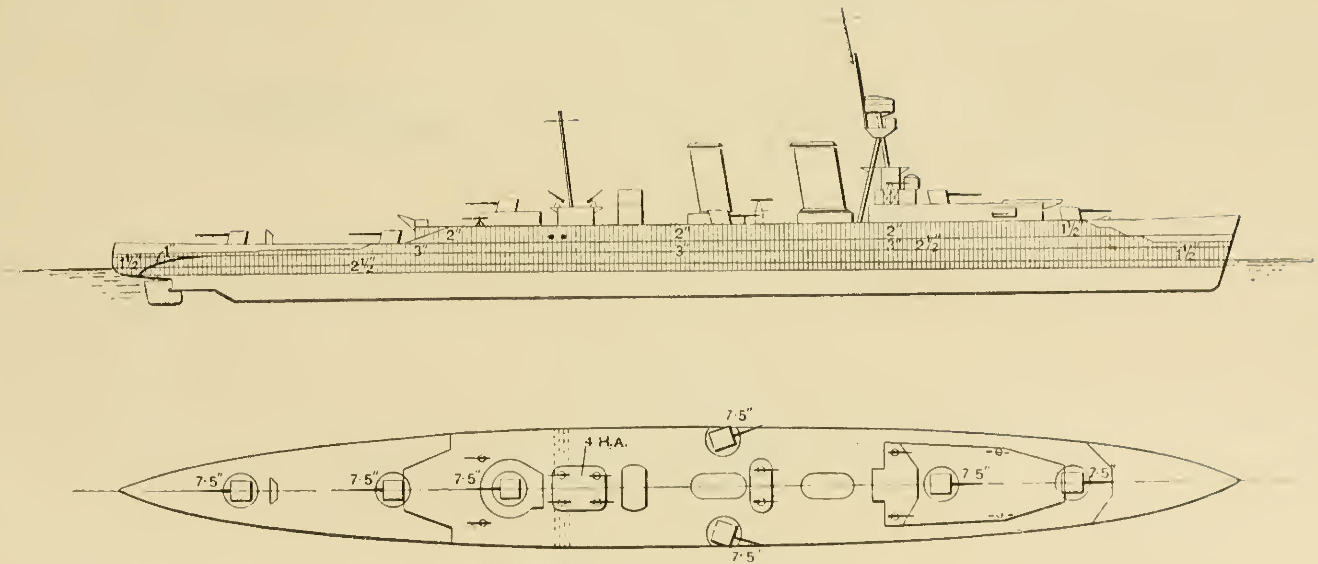
Length, 555 ft. ; 18,800 tons ; Speed, 25 knots ; Completed, 1913 ; Armament, 8—12 in., 12—4 in. (New Zealand, 10—4 in.), 4—3 pr., 5 M., 2—4 in. H.A (New Zealand, 1—4 in. H.A.).

* The diagrams show also the obsolescent ships Indomitable and Inflexible ; but in the New Zealand and Australia the centre turrets are more *en échelon* than in the two earlier ships.

GREAT BRITAIN.

LIGHT CRUISERS.

Effingham. Hawkins. Frobisher.



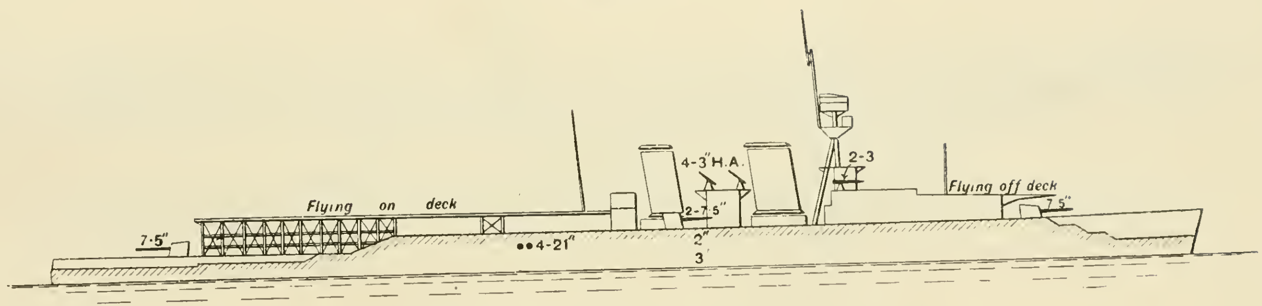
Length, 565 ft. ; 9750 tons ; Speed, 30 knots ;
Armament, 7—7·5 in., 4—3 in. H.A., 1—12 pr., 12 M.

GREAT BRITAIN.

LIGHT CRUISER.

Vindictive.

Airplane Carrier.

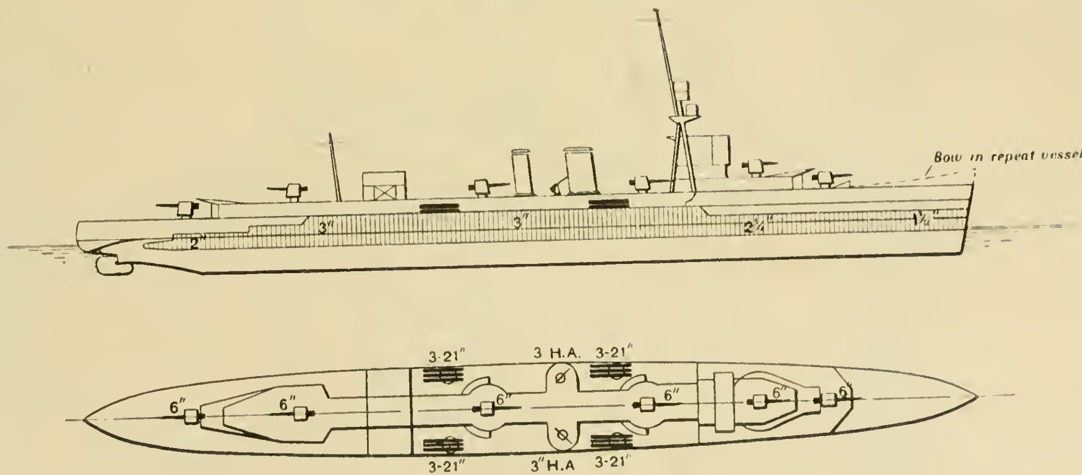


Length, 565 ft.; 9750 tons; Speed, 28·75 knots; Completed, 1918;
Armament, 4—7·5 in., 4—3 in., 4—3 in. H.A., 1—12 pr., 13 M.

GREAT BRITAIN.

LIGHT CRUISERS. D CLASS.

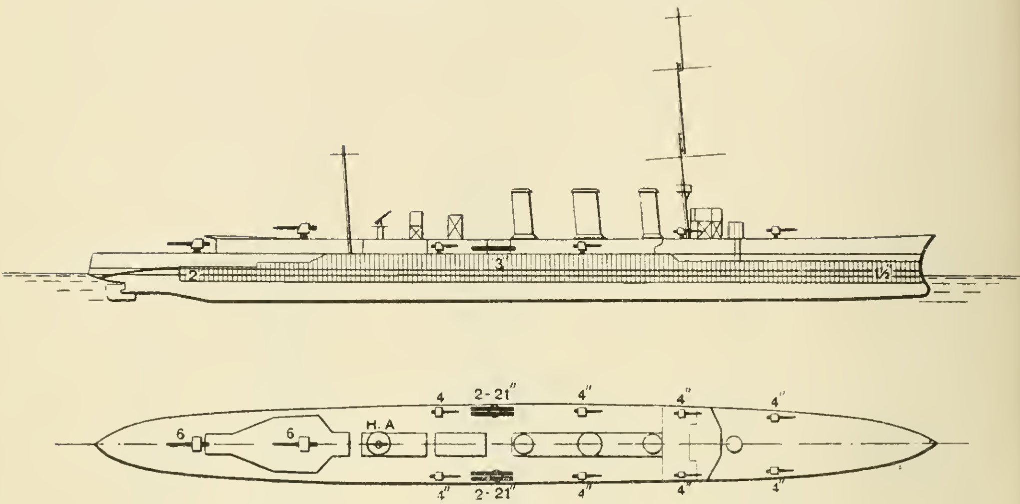
Despatch. Diomede. Danae. Dauntless. Dragon. Delhi. Dunedin. Durban.



Length, 445 ft.; 4750 tons; Speed, 29 knots;
Armament, 6—6 in., 2—3-in. H.A., 16 M.

NOTE.—Despatch, Diomede. and Durban have 2—4-in. H.A. guns.

LIGHT CRUISERS C CLASS (as originally built).



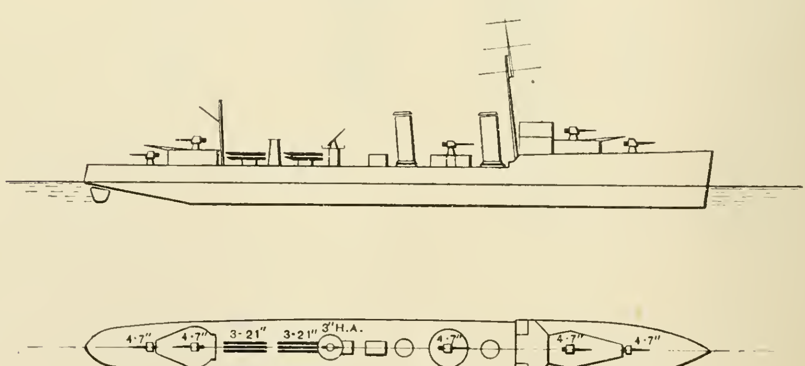
Length, 420–425 ft.; 3750 tons to 4190 tons; Speed, 29 knots;
Armament, 2—6 in.; 8—4-in.; 1 H.A.

Calliope, Conquest, Cordelia, Carysfort, Cleopatra, Comus, Caroline	3 funnels	Conning tower and foremast removed since completion and tripod foremast added. 6-in. gun added on centre-line forward in lieu of 2—4-in. 6-in. gun added on centre-line amidships in lieu of 4—4-in. guns at waist.
Champion, Cambrian, Canterbury, Castor, Constance	2 funnels	

Centaur, Concord, Caledon, Calypso, Caradoc	2 funnels	5—6-in. guns, all on centre-line, 2—3-in. H.A.
Ceres, Curacoa, Curlew, Cardiff, Coventry, Cairo, Cape Town, Carlisle, Colombo, Calcutta	2 funnels	5—6-in. guns on centre-line, arranged as in D class, *i.e.*, end guns superimposed, 2—3-in. H.A.

NOTE.—Some C class cruisers have submerged tubes only and no above-water tubes. For full particulars of armament see pages 320 and 321.

FLOTILLA LEADERS: SCOTT CLASS.

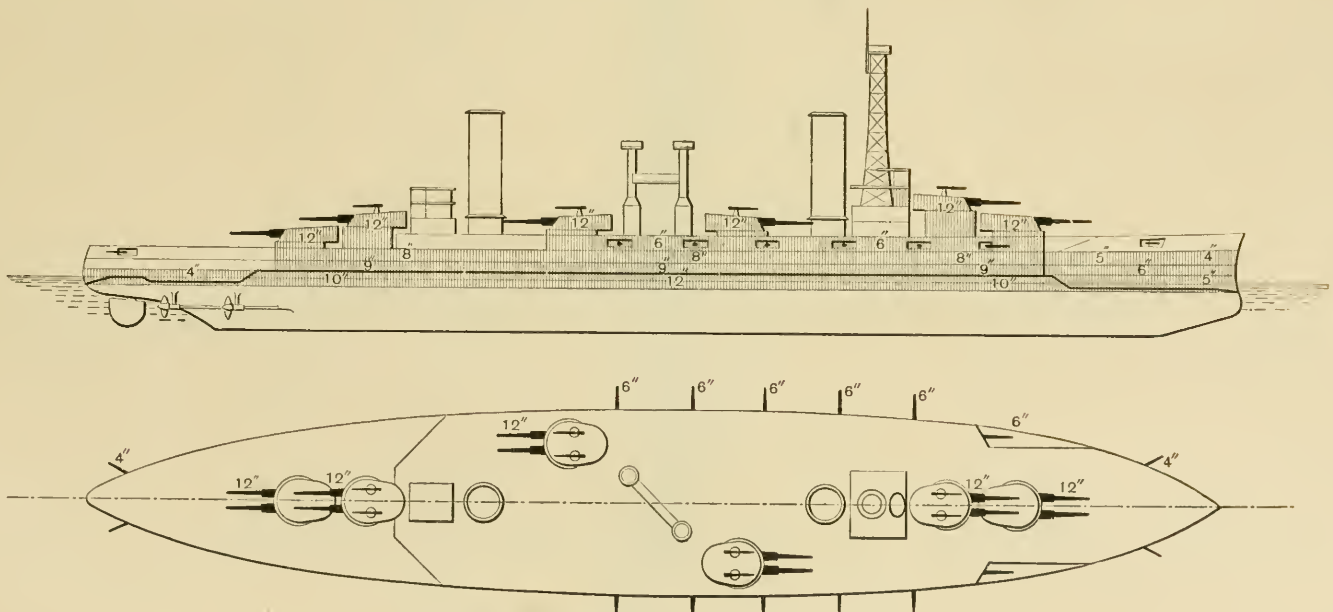


Length, 320 ft.; 1800 tons; Speed, 36·5 knots;
Armament, 5—4·7 in.; 1—3-in. A.A.

ARGENTINE.

BATTLESHIPS.

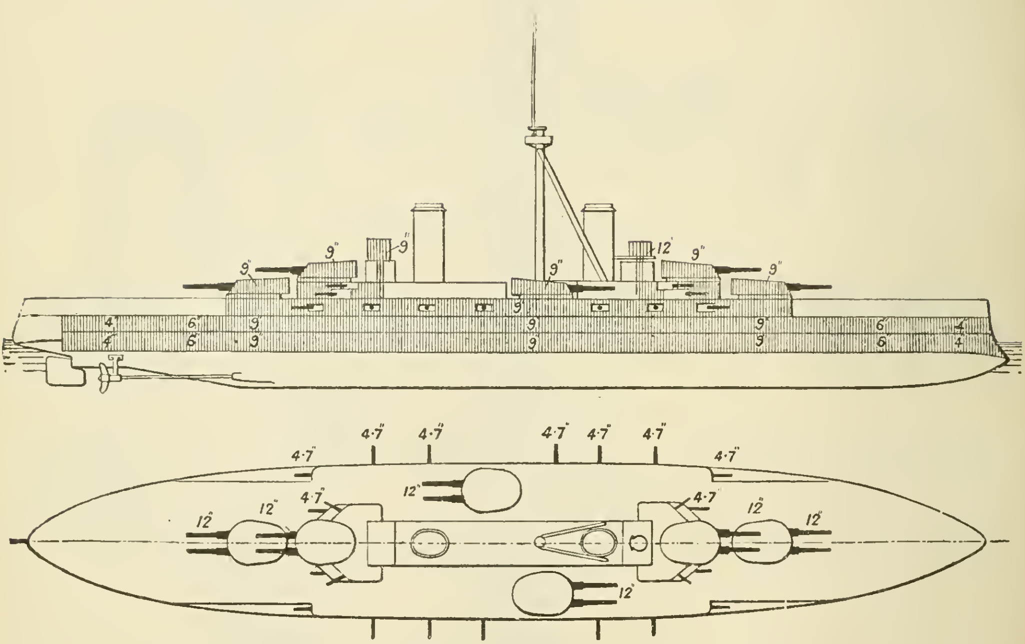
Moreno. Rivadavia.



Length, 585 ft. ; 27,600 tons ; Speed, 22·5 knots ; Completed, 1914 ;
Armament, 12—12 in., 12—6 in., 14—4 in., 10 smaller.

BATTLESHIPS.

Minas Geraes. São Paulo.

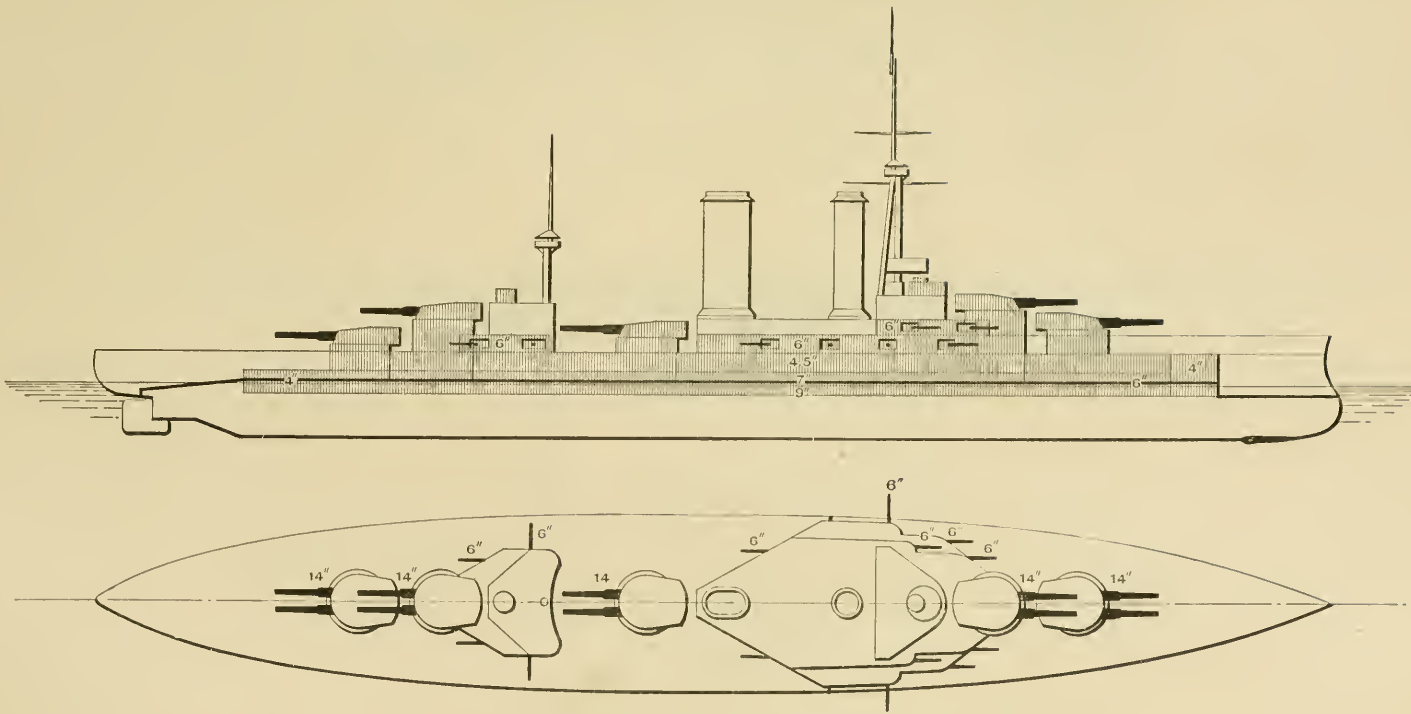


Length, 500 ft. ; 19,281 tons ; Speed, 21·5 knots ; Completed, 1909, 1910 ;
Armament, 12—12 in., 22—4·7 in., 8—3 pr.
Overhauled and refitted at Brooklyn Navy Yard, 1921-22, and A.A. guns installed.

CHILE.

BATTLESHIP.

Almirante Latorre (*formerly* H.M.S. Canada).

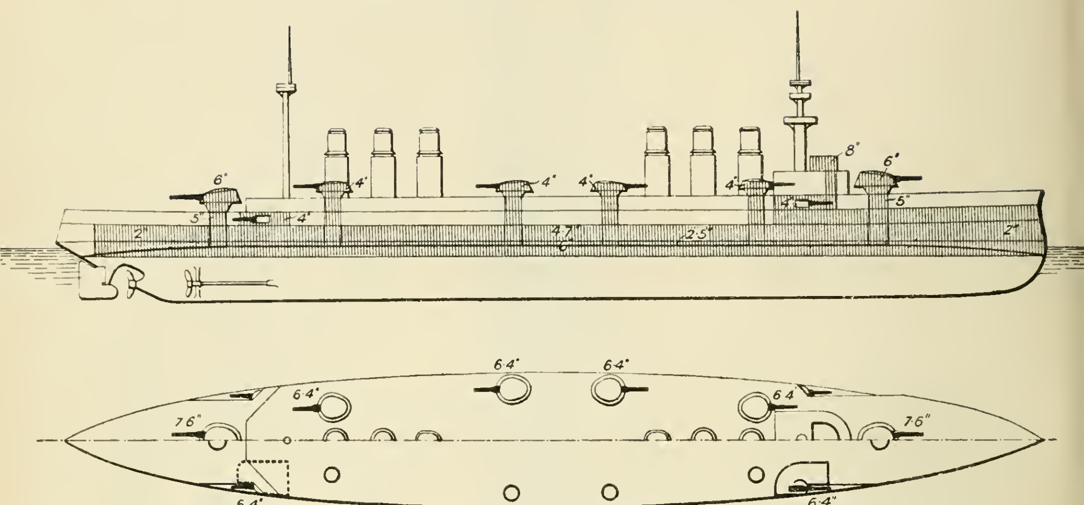


Length, 625 ft. ; 28,000 tons ; Speed, 23 knots ;
Armament, 10—14 in. ; 14—6 in. ; 6—3 in., and smaller.

FRANCE

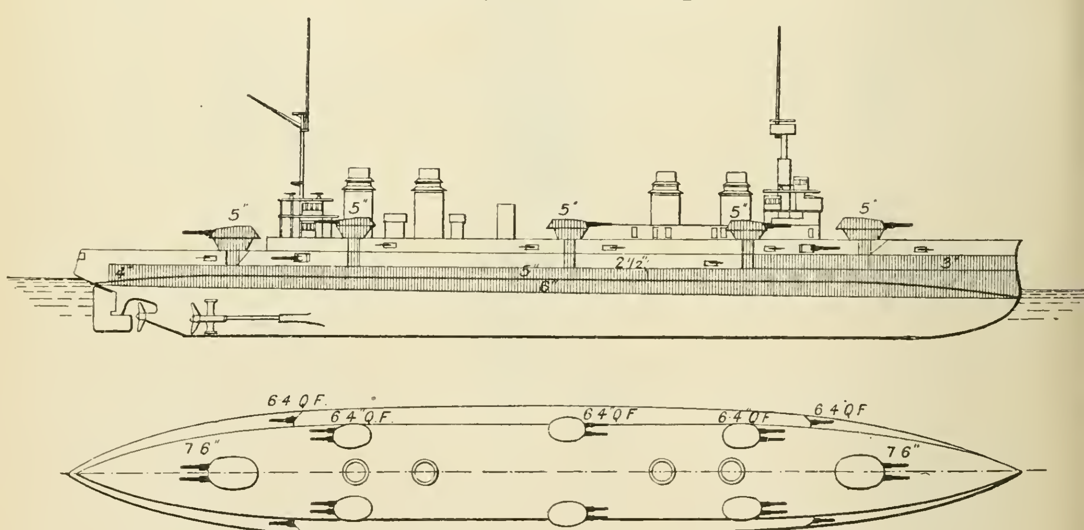
ARMOURED CRUISERS.

Ernest Renan. **Jules Michelet.**



Length, 515 ft. and 489½ ft. ; 13,427 tons and 13,370 tons ; Speed, 25·5 knots and 23·2 knots ; Completed, 1909 and 1908 ; Armament, 4—7·6 in., 12—6·4 in., 24 small (only 2 small guns in Jules Michelet).
The Jules Michelet has only four funnels.

Jules Ferry. **Victor Hugo**

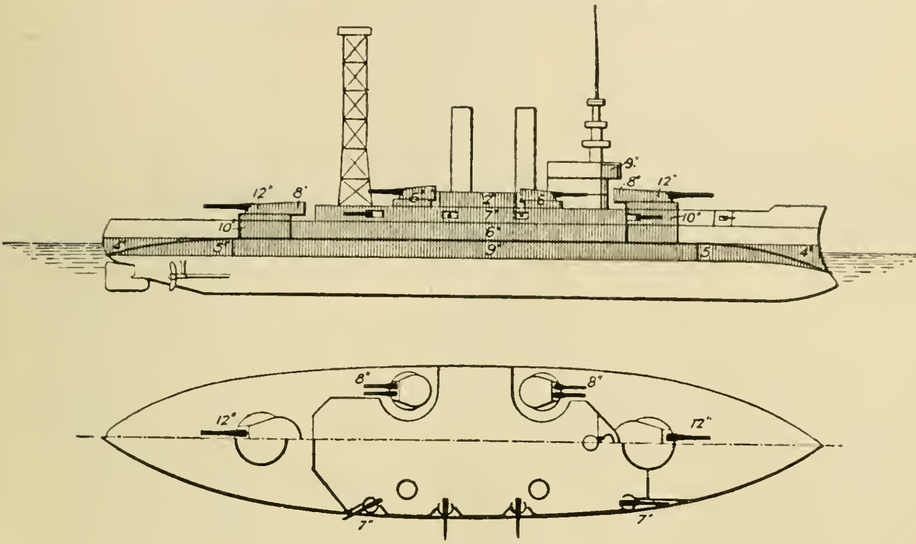


Length, 487 ft. and 480·5 ft. ; 12,351 and 13,108 tons ; Speed, 22·8 and 22·5 knots ; Completed, 1906–1907 ; Armament, 4—7·6 in., 16—6·4 in., 24 small.

GREECE.

BATTLESHIPS.

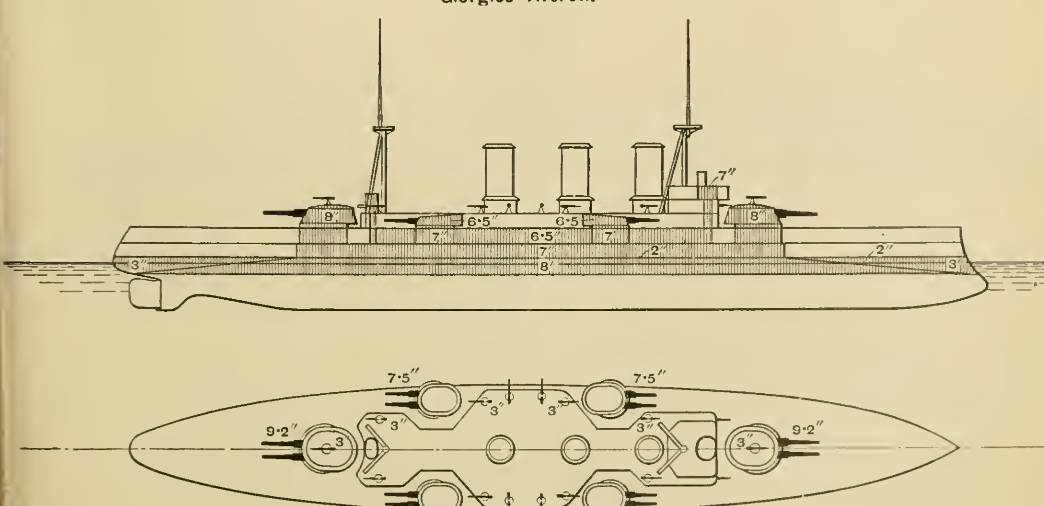
Lemnos (*ex*-Idaho). **Kilkis** (*ex*-Mississippi).



Length, 375 ft. ; 13,000 tons ; Speed, 17·1 knots ; Completed, 1908 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 14 small.

ARMOURED CRUISER.

Giorgios Averoff.

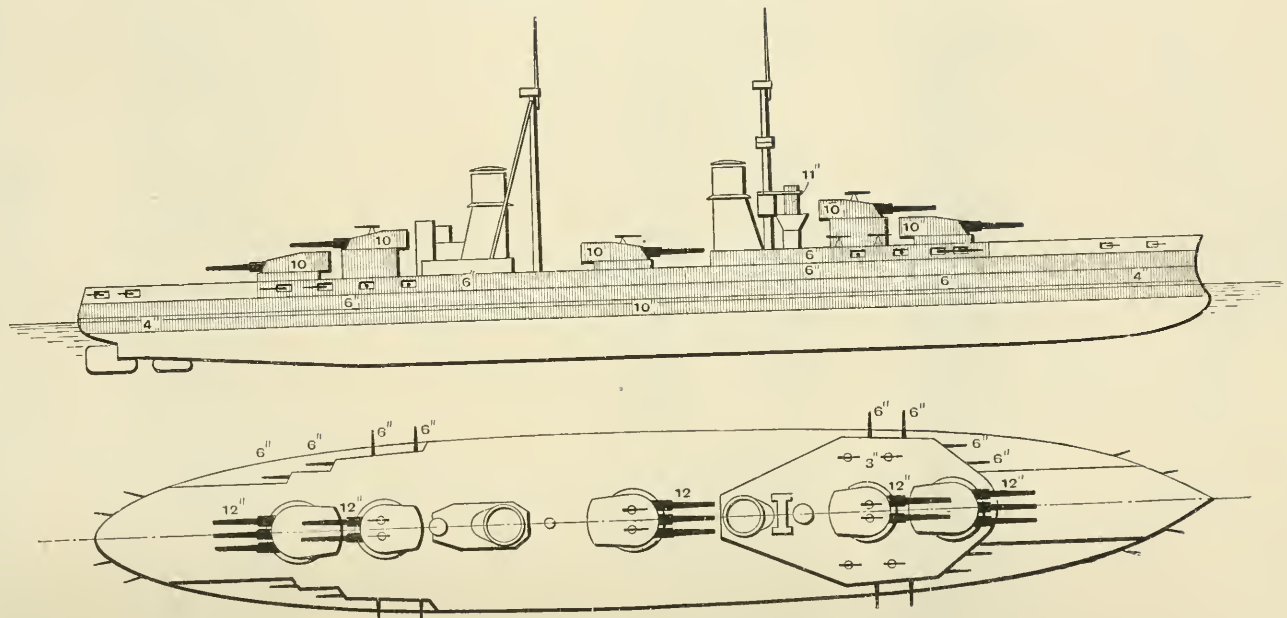


Length, 429¾ ft. ; 9956 tons ; Speed, 24 knots ; Completed, 1911 ;
Armament, 4—9·2 in., 8—7·5 in., 16—3 in., 8 small.

ITALY.

BATTLESHIPS.

Andrea Doria. Caio Duilio.



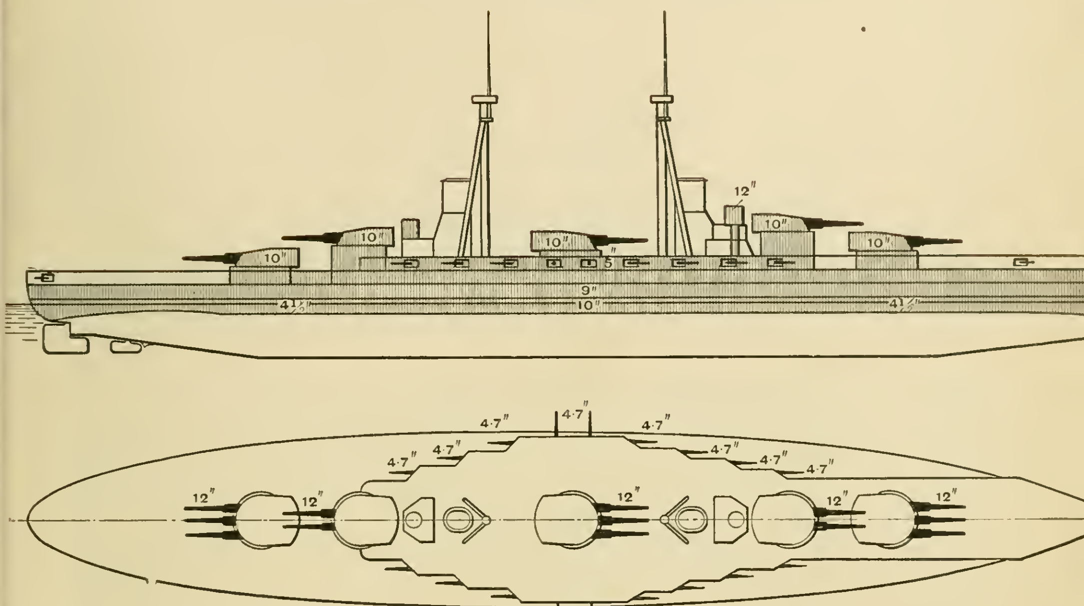
Length, 575¾ ft. ; 22,562 tons ; Speed, 23 knots ; Completed, 1915 ;
Armament, 13—12 in., 16—6 in., 14—14 pr., 4 l. and M., 6—14 pr. H.A.

N.B.—In the next succeeding class, Francesco Morosini, Caracciolo, Cristoforo Colombo, and Marcantonio Colonna, eight 15-in. guns were being mounted in four turrets on the middle line, as in the Queen Elizabeth. Work on these vessels has been stopped.

ITALY.

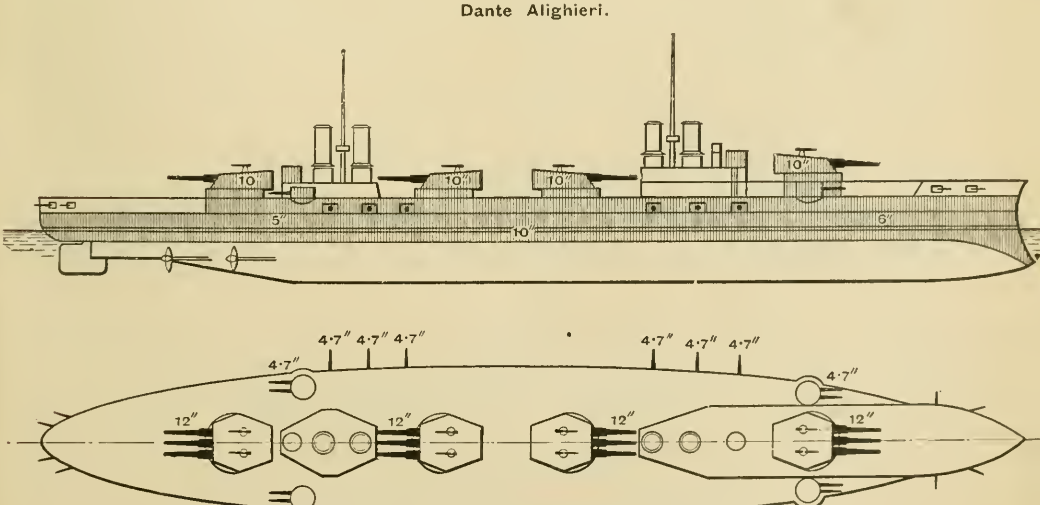
BATTLESHIPS.

Conte di Cavour. Giulio Cesare. Leonardo da Vinci.



Length, 557 ft. ; 22,023 tons ; Speed, 22–23 knots ; Completed, 1914, 1915 ; Armament, 13—12 in., 18—4·7 in., 14—12 pr.

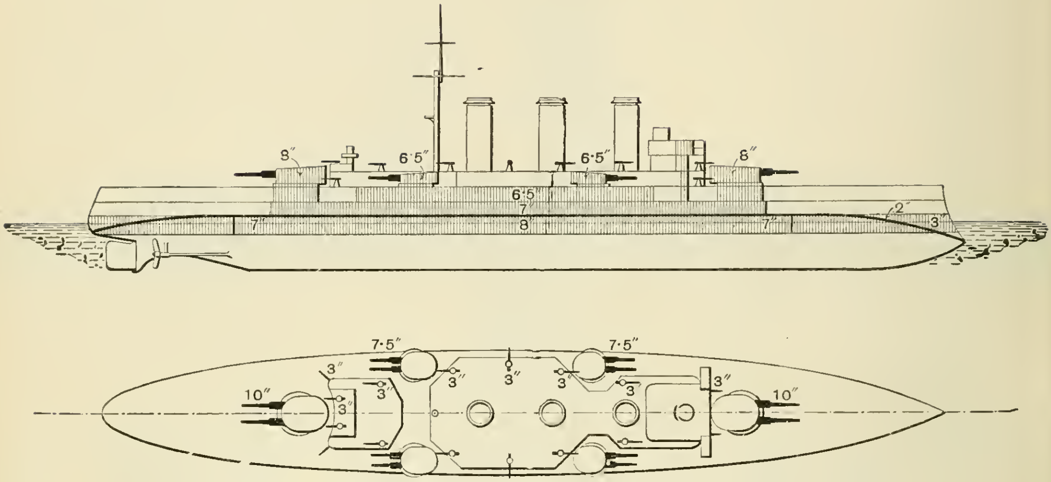
Dante Alighieri.



Length, 505 ft. ; 19,400 tons ; Speed, 23·8 knots ; Completed, 1912 ; Armament, 12—12 in. 20—4·7 in., and 14—12 pr.

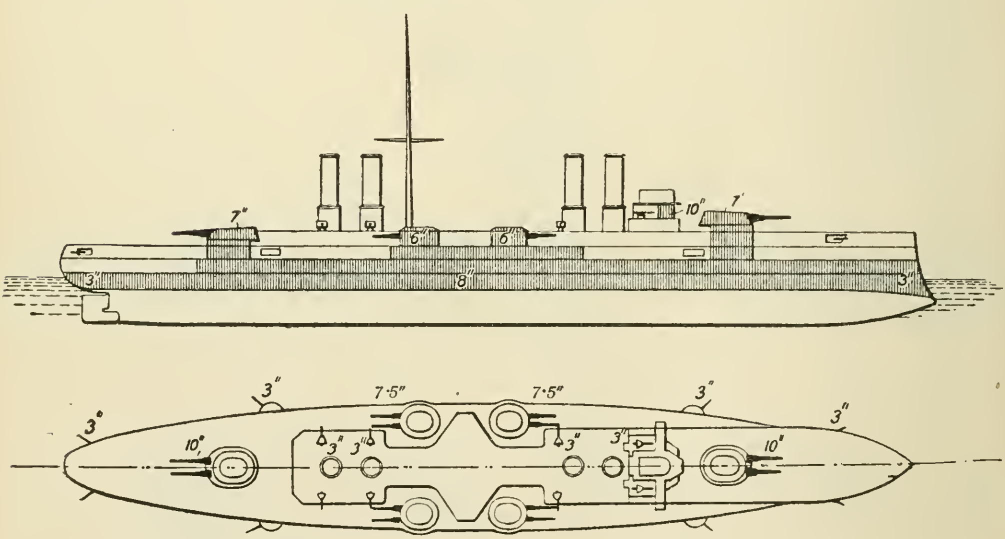
ARMOURED CRUISERS.

Pisa.



Length, 429¾ ft. ; 9956 tons ; Speed, 23 knots ; Completed, 1908 ;
Armament, 4—10 in., 8—7·5 in., 16—3 in., 8 small.

S. Giorgio. S. Marco.



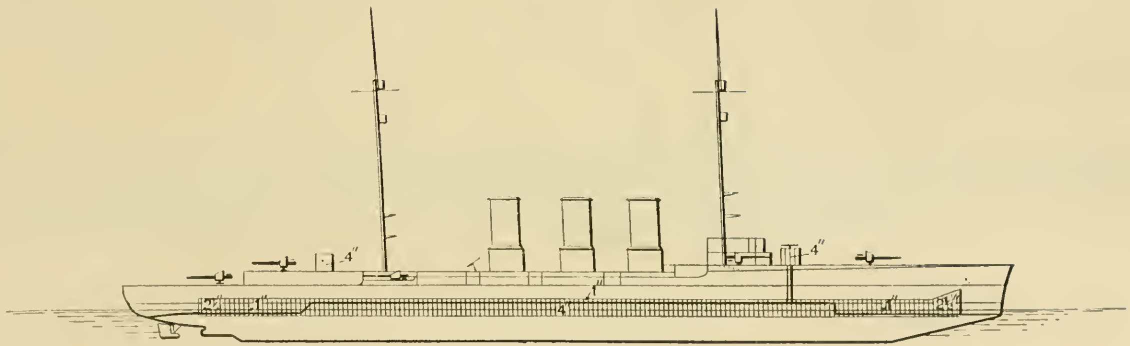
Length, 429¾ ft. ; 9832 tons ; Speed, 22·5 knots ; Completed, 1910 ;
Armament, 4—10 in., 8—7·5 in., 16—3 in., 4 small.

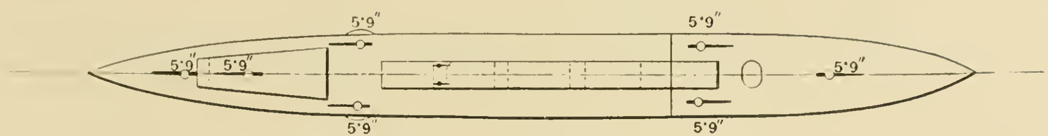
ITALY.

LIGHT CRUISER.

Ancona (*formerly German* **Graudenz**).

(The sister ship **Regensburg** was allocated to France, and is now named **Strasbourg.**)





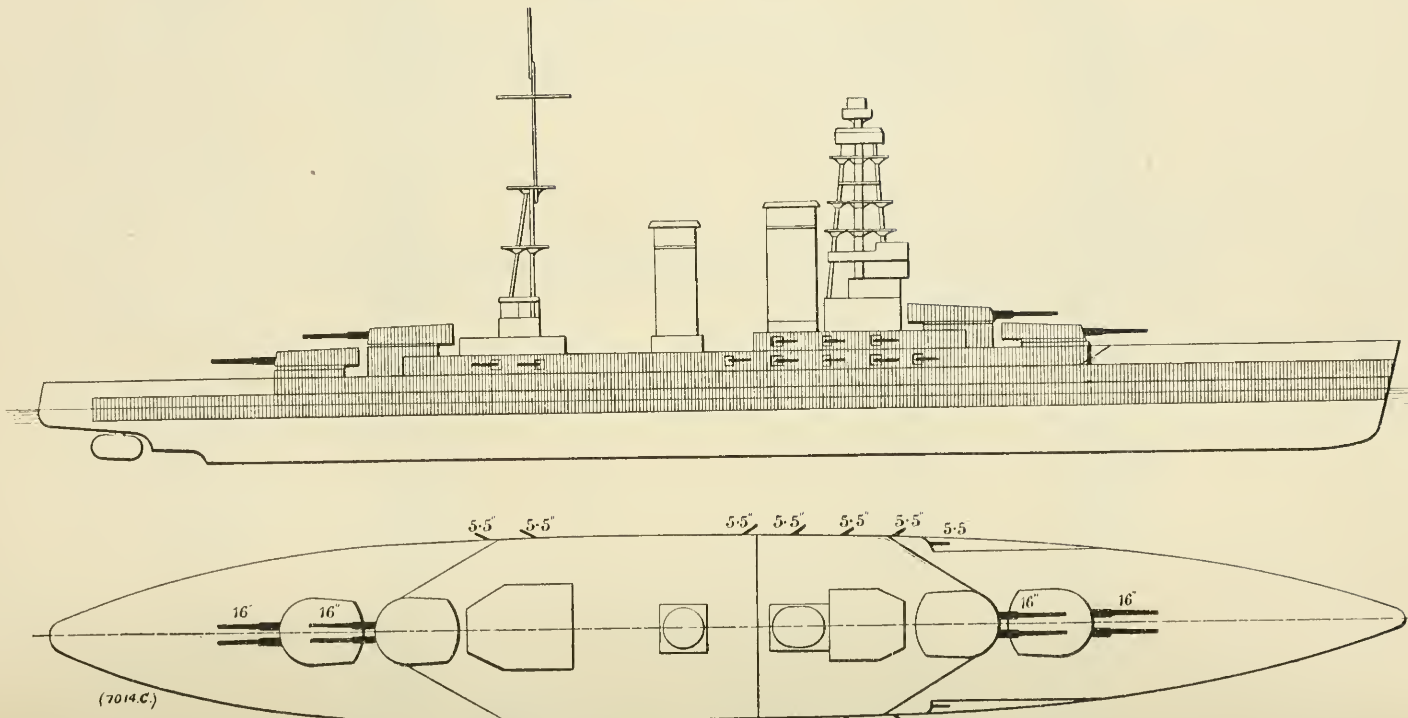
Length, 456 ft.; 4842 tons; Speed, 27½ knots; Completed, 1914;
Armament, 7—5·9 in., 2—22 pr., 2 M.

NOTE.—The above are typical of the latest *ex*-German Light Cruisers, except the mine-laying cruisers Brummer and Bremse, in which no armour belt was fitted and an all-centre-line armament adopted.

JAPAN.

BATTLESHIP.

Nagato. **Mutsu.**

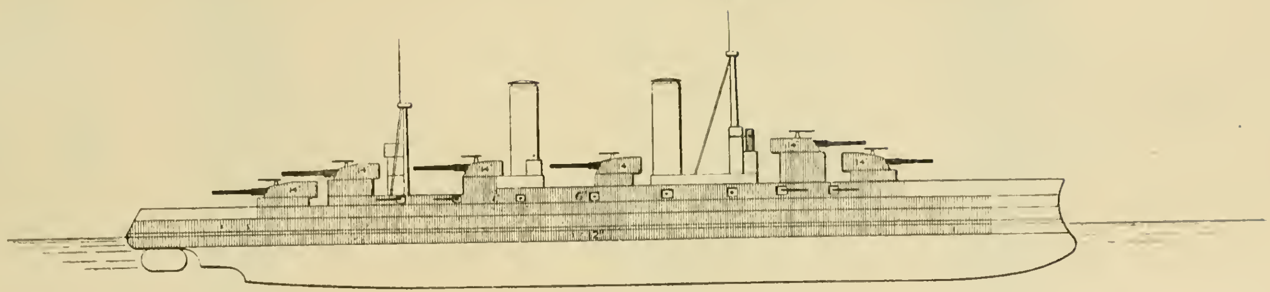


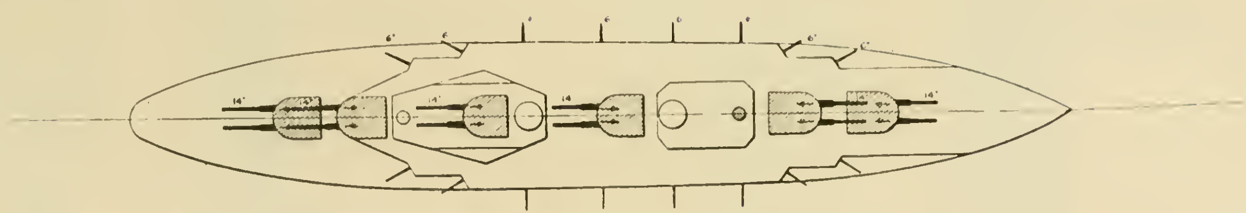
Length, 700 ft.; 33,800 tons; Speed, 23·5 knots; Completed, 1920;
Armament, 8—16 in., 20—5·5-in., 4—12 pr. A.A.

JAPAN.

BATTLESHIPS.

Fuso. Yamashiro





Length, 630 ft.; 30,600 tons; Speed, 23 knots; Completed, 1915—1917;
Armament, 12—14-in., 16—6-in., 4—12 pr. A.A.

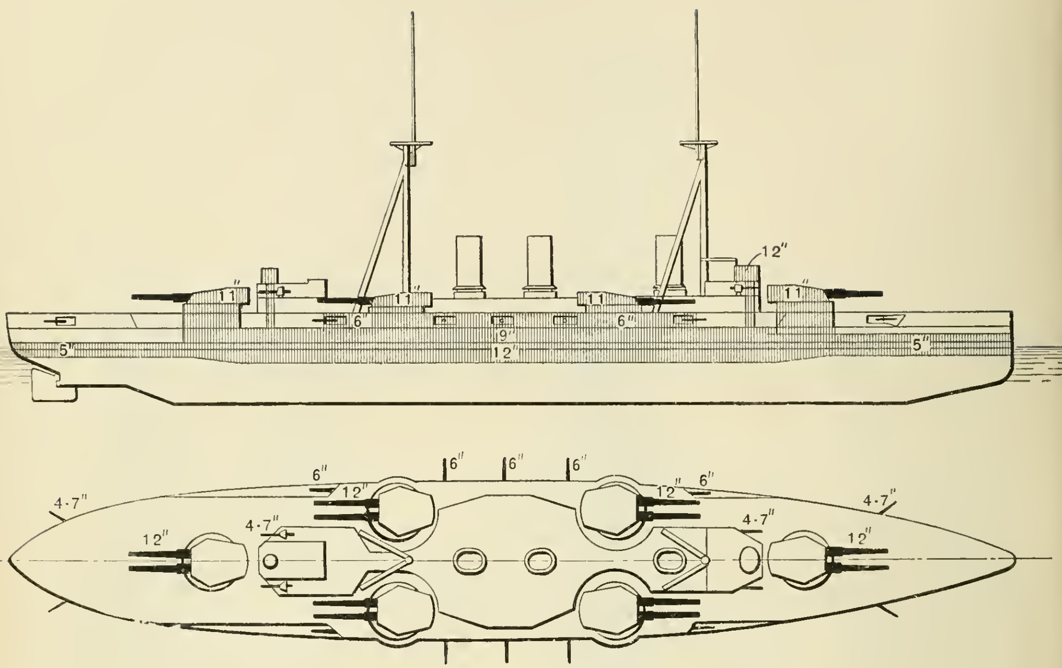
NOTE.—The armour on the turrets is 12 in., not 14 in. as shown, and, owing to an oversight in the drawing, the armoured substructure of the conning-tower is not shown; also the water-line belt is continued to the bows.

The sister ships Hyuga and Ise have superposed turret amidships, and the secondary guns are grouped forward excepting four, which fire astern.

JAPAN.

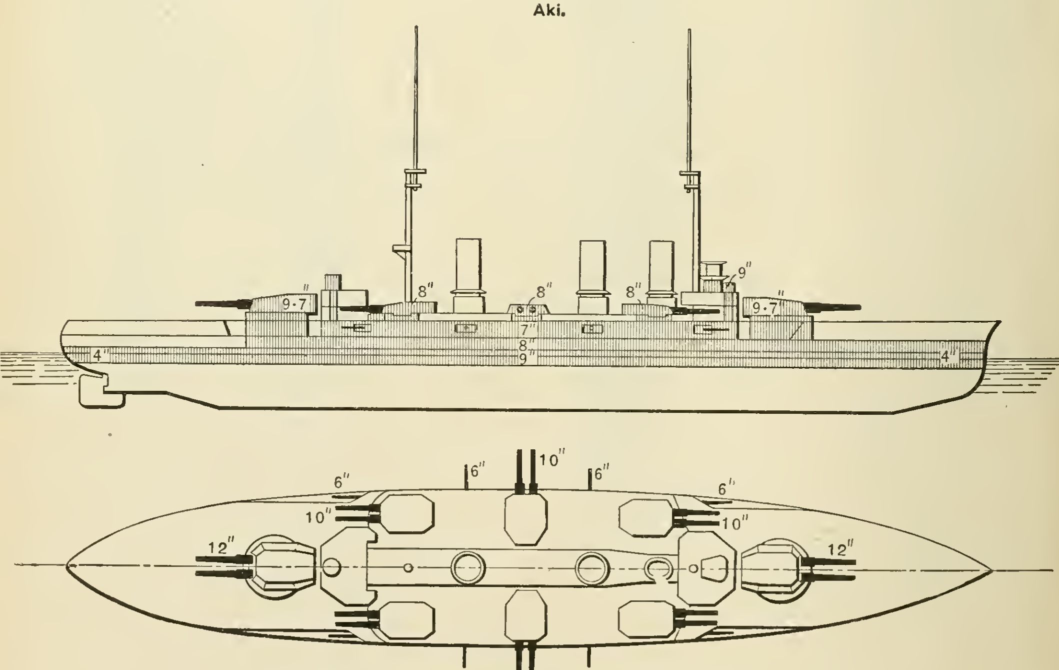
BATTLESHIPS.

Settsu.



Length, 500 ft. ; 20,800 tons ; Speed, 20·5 knots ; Completed, 1912 ;
Armament, 12—12 in., 10—6 in., 8—4·7 in., 16 small.

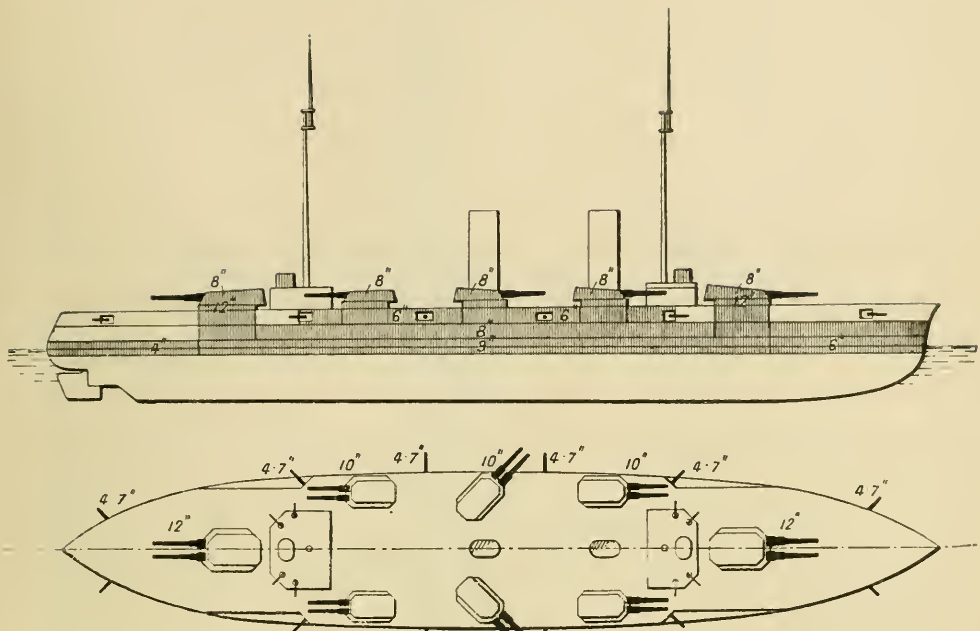
Aki.



Length, 460 ft. ; 19,800 tons ; Speed, 20·5 knots ; Completed, 1910 ;
Armament, 4—12 in., 12—10 in., 8—6 in., 8—12 pr., 8 small.

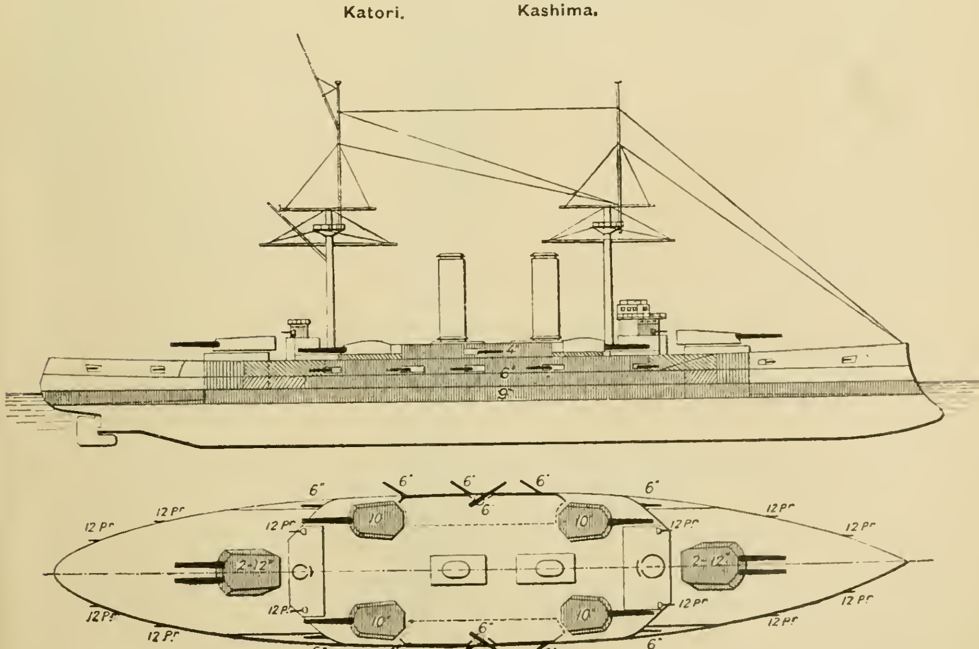
BATTLESHIPS.

Satsuma.



Length, 450 ft. ; 19,350 tons ; Speed, 18·5 knots ; Completed, 1910 ;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr., 8 small.

Katori. Kashima.

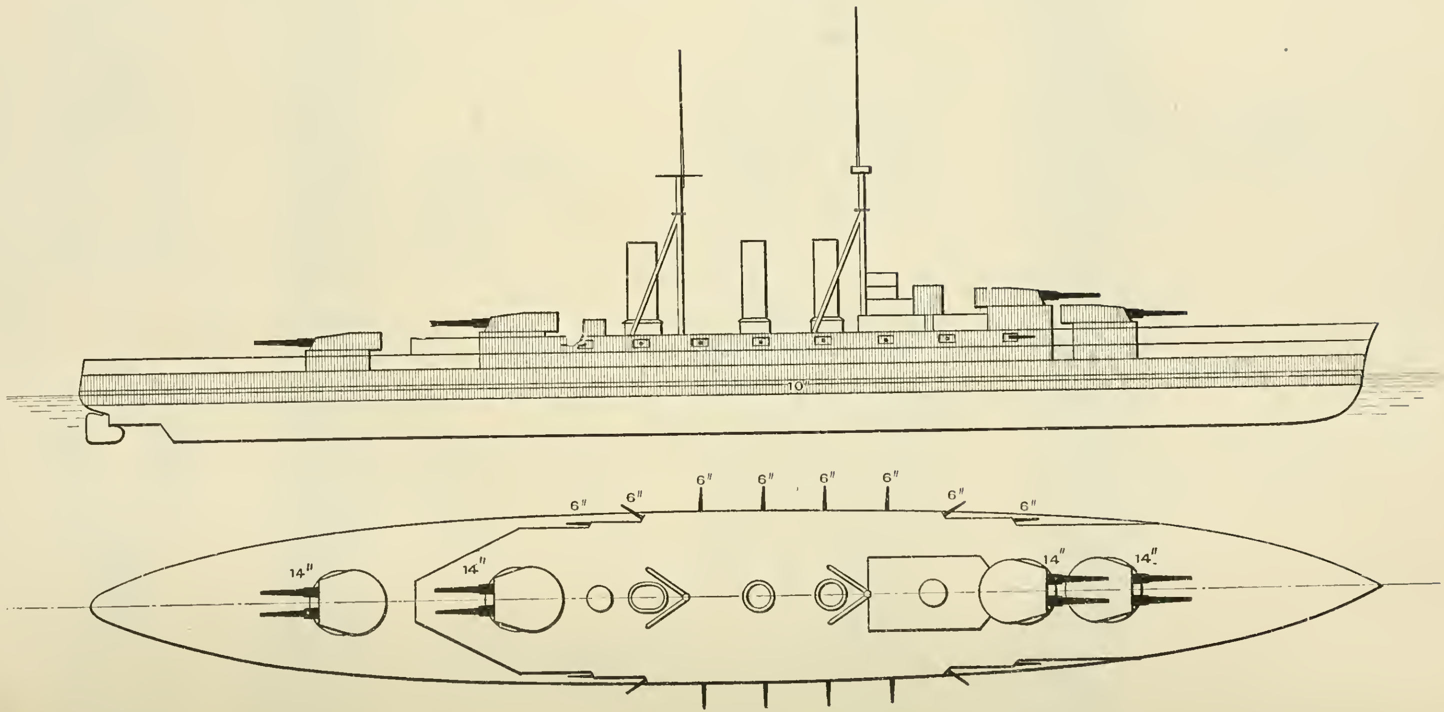


Length, 420–425 ft. ; 15,975-16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4—10 in., 12—6 in., 12—12 pr., 7 small.

JAPAN.

BATTLE-CRUISERS.

Kongo. Hiyei. Haruna. Kirishima.



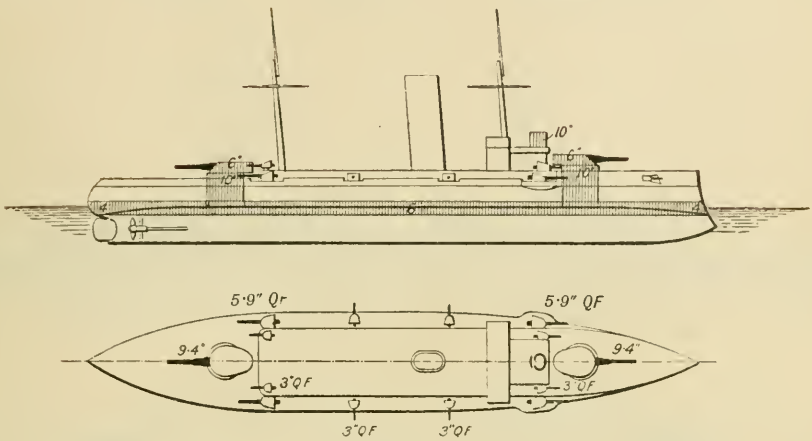
Length, 653½ ft.; 27,500 tons; Speed, 27·5 knots; Completed, 1913—1915; Armament, 8—14 in., 16—6 in., 4—12 pr. H.A.

PLATE 32.

NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter. Hertog Hendrik. Marten Tromp.

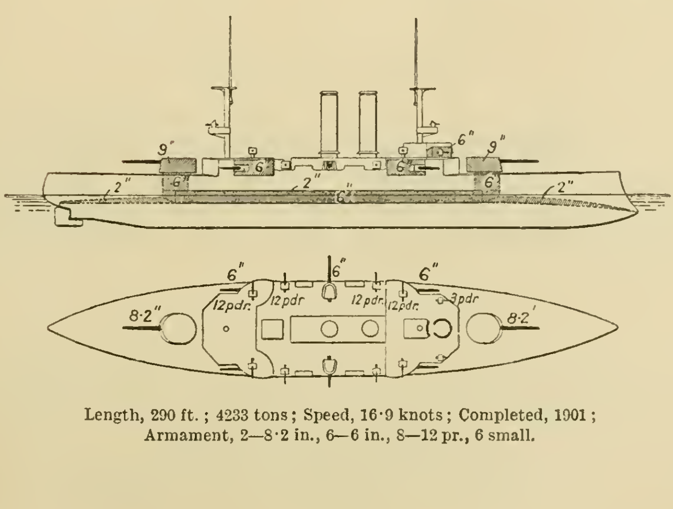


Length, 316¾–330 ft.; 5000—5216 tons; Speed, 14·5 knots; Completed, 1903—1906;
Armament, De Ruyter and Hertog Hendrik: 2—9·4 in., 6—5·9 in., 4—2·9 in., 4 or 6 small.
Marten Tromp: 2—9·4 in., 4—5·9 in., 8—2·9 in., 6 small

NORWAY.

COAST DEFENCE SHIPS.

Norge Eidsvold.

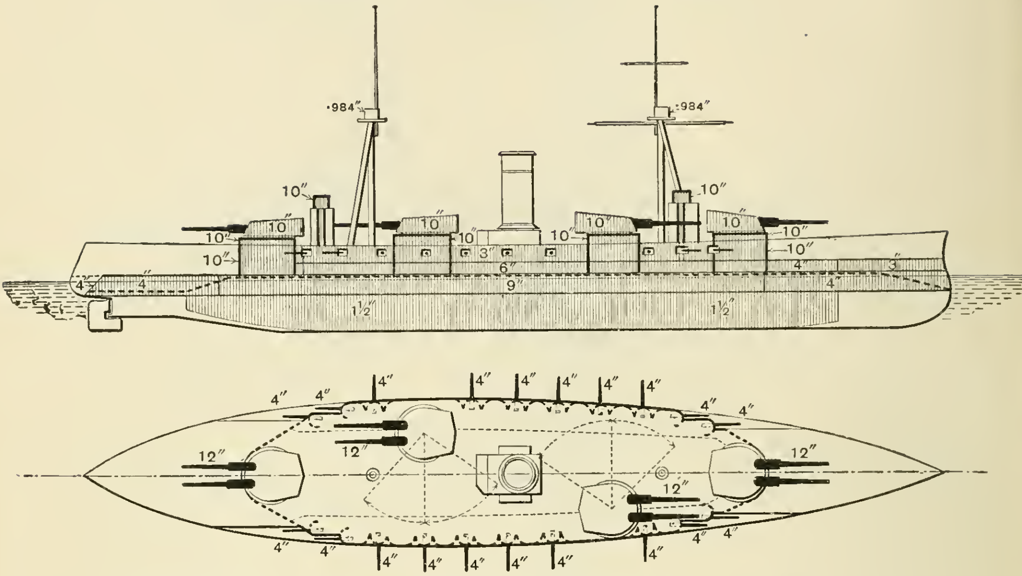


Length, 290 ft.; 4233 tons; Speed, 16·9 knots; Completed, 1901;
Armament, 2—8·2 in., 6—6 in., 8—12 pr., 6 small.

SPAIN.

BATTLESHIPS.

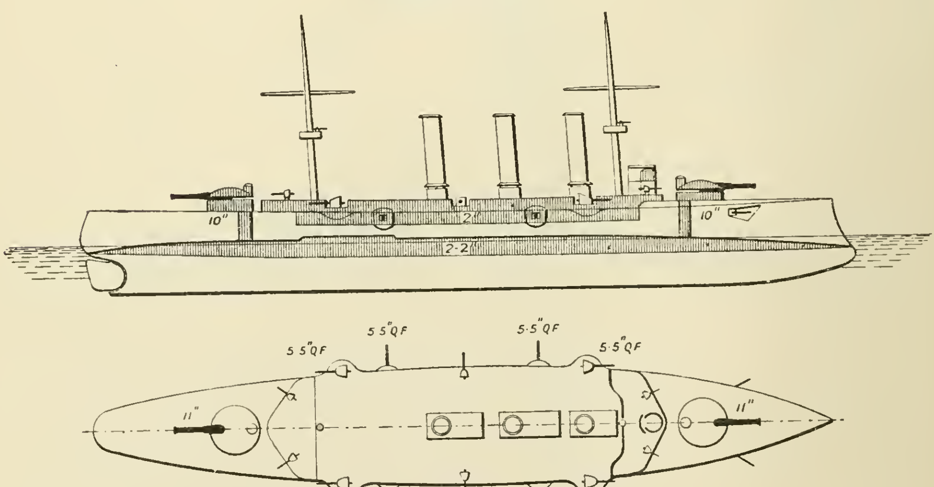
Alphonso XIII. España. Jaime I.



Length, 459–433 ft. ; 15,460–15,700 tons ; Speed, 19·5 knots to 20·2 knots ; Completed, 1913–1916 ;
Armament, 8—12 in., 20—4 in., 6 small.

ARMOURED CRUISER

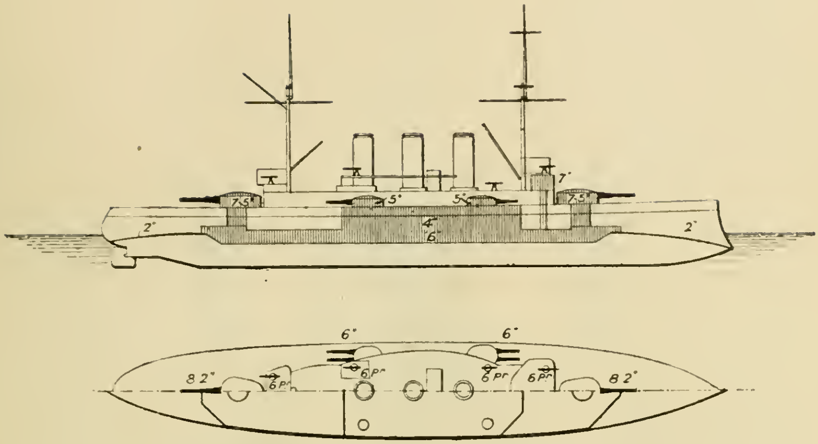
Emperador Carlos V.



Length, 404 ft. ; 9900 tons ; Speed, 19 knots ; Completed, 1898 ;
Armament, 2—11 in., 8—5·5 in., 4—4·1 in., 22 small.

BATTLESHIP.

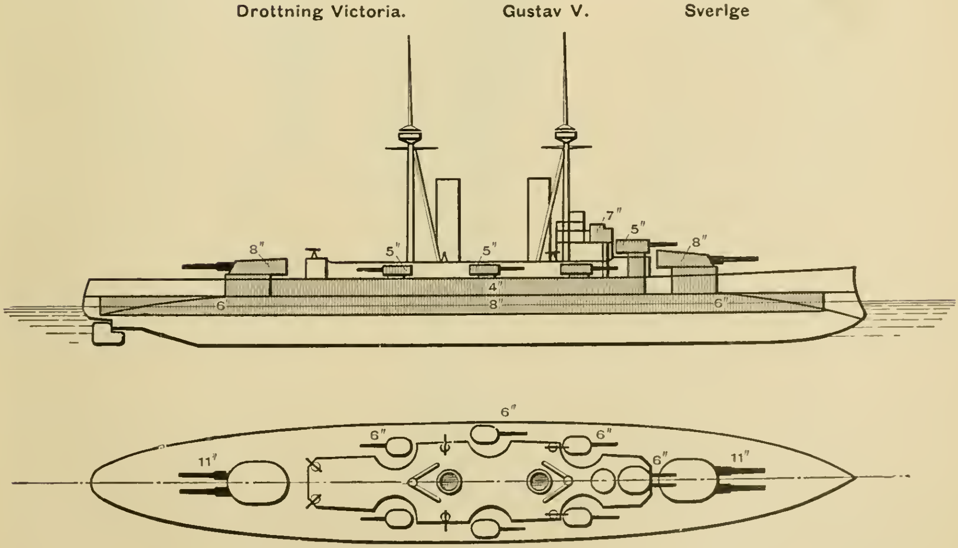
Oscar II.



Length, 313·6 ft. ; 4658 tons ; Speed, 18 knots ; Completed, 1907 ;
Armament, 2—8·2 in., 8—6 in., 14 small.

ARMOURED CRUISERS.

Drottning Victoria. Gustav V. Sverige

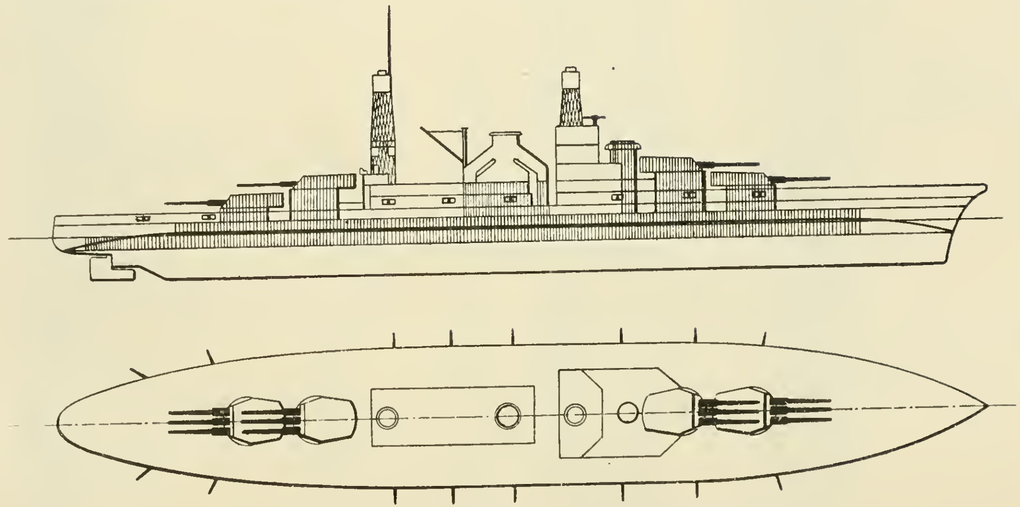


Length, 376·7–372·7 ft. ; 7605 tons ; Speed, 22 knots. Completed, 1917–1922.
Armament, 4—11 in., 8—6 in. ; 6—12 pr., 4 small.

UNITED STATES.

BATTLESHIPS.

South Dakota. Indiana. Montana. North Carolina. Iowa. Massachusetts



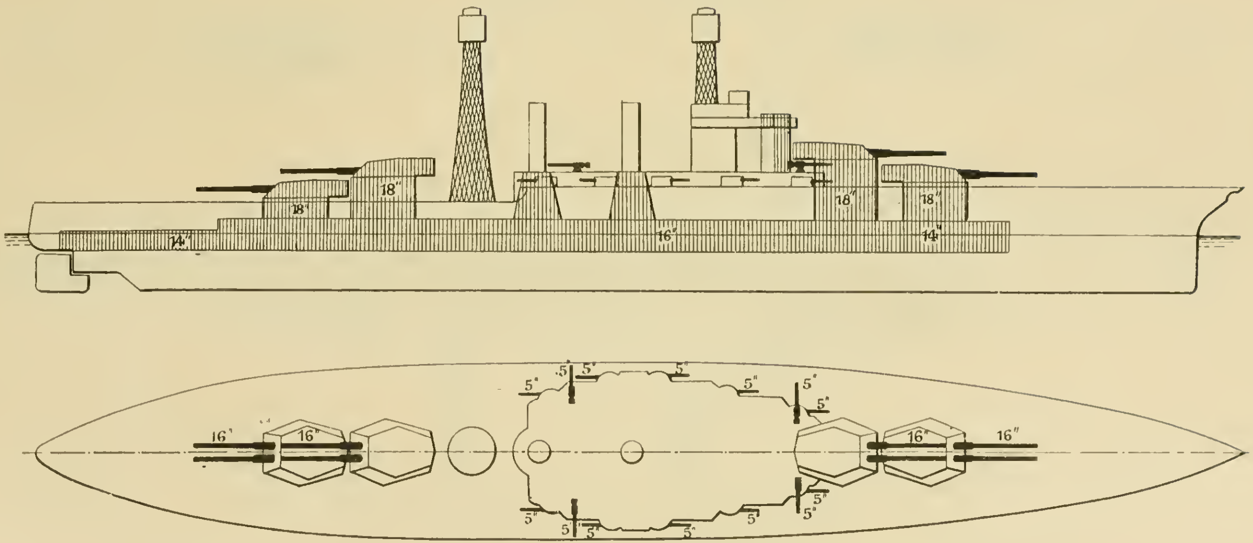
Length, 660 ft. ; 43,200 tons ; Speed, 23 knots ; (Building) ;
Armament, 12—16 in., 16—6 in., 4—3 in. H.A. ; Torpedo Tubes, 2—21 in. submerged.

Under the Treaty of Washington (Chap. I., Art. III.) these ships will not be completed.

UNITED STATES.

BATTLESHIPS.

Colorado. Maryland. Washington. West Virginia.



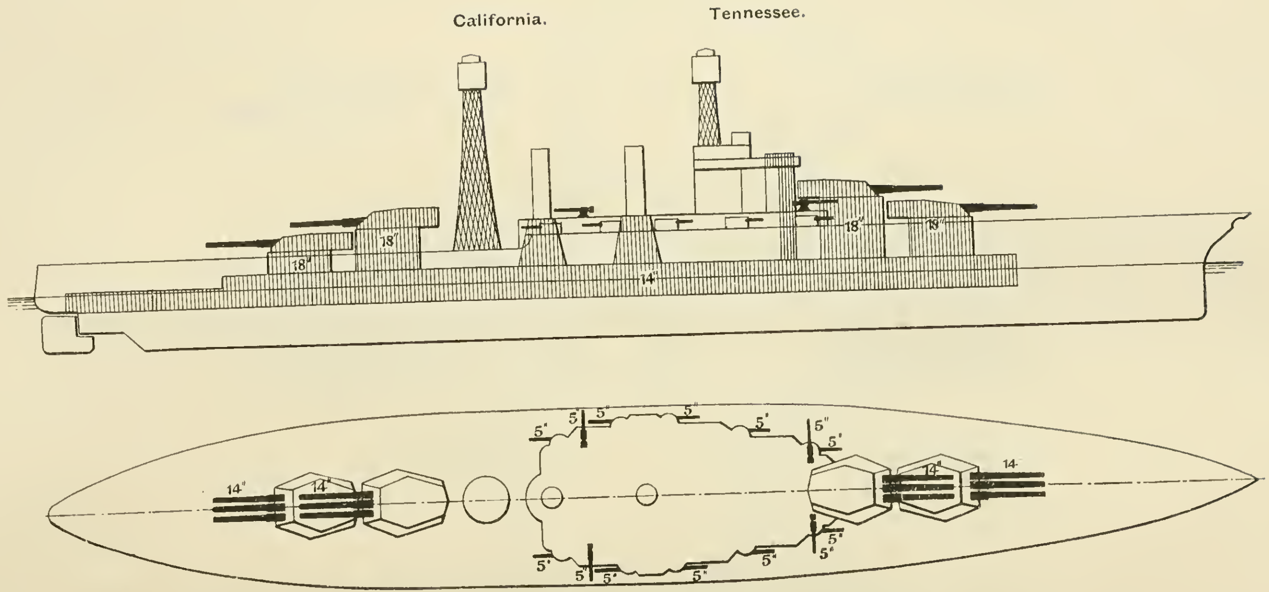
Length, 600 ft.; 32,600 tons; Speed, 21 knots;

Armament, 8—16 in., 14—5 in., 4—3 in. A.A., 4—6 pr

Under the Treaty of Washington (Chap. I., Art. III.) the Washington, launched in 1920, will not be completed. Under Chap. II., Part I., the Maryland is retained, and under Chap. I., Art. II., the Colorado and West Virginia will be completed.

UNITED STATES.

BATTLESHIPS.

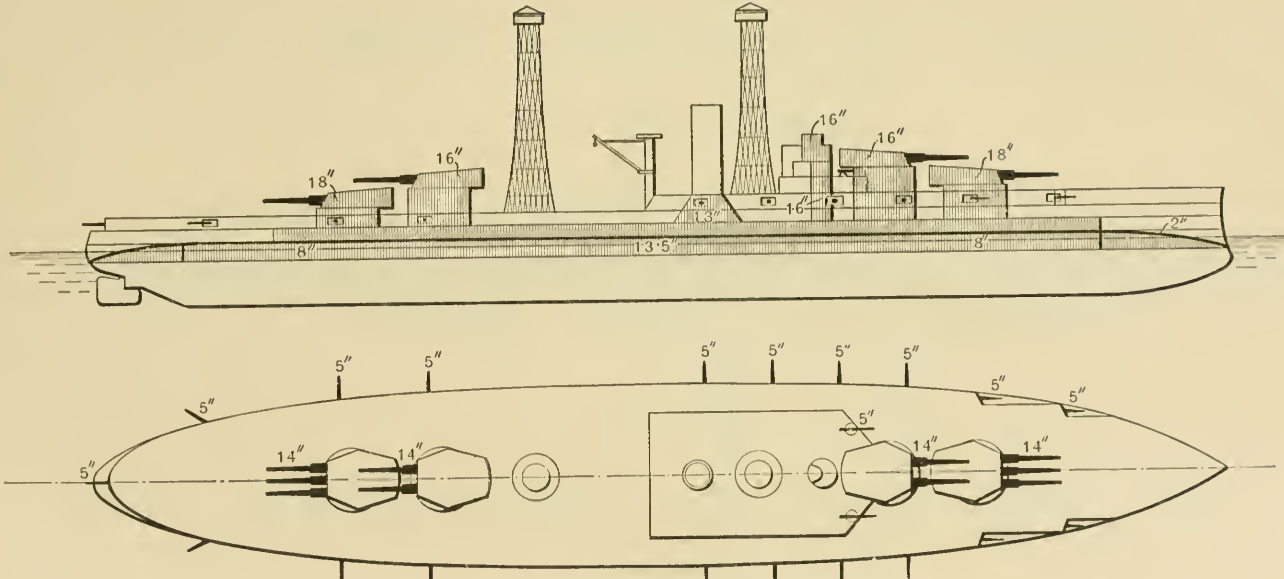


Length, 624 ft. and 600 ft.; 32,400 tons; Speed, 21 knots;
Armament, 12—14 in., 14—5 in., 4—3 in. A.A., 9 small.

UNITED STATES.

BATTLESHIPS.

Nevada. Oklahoma.

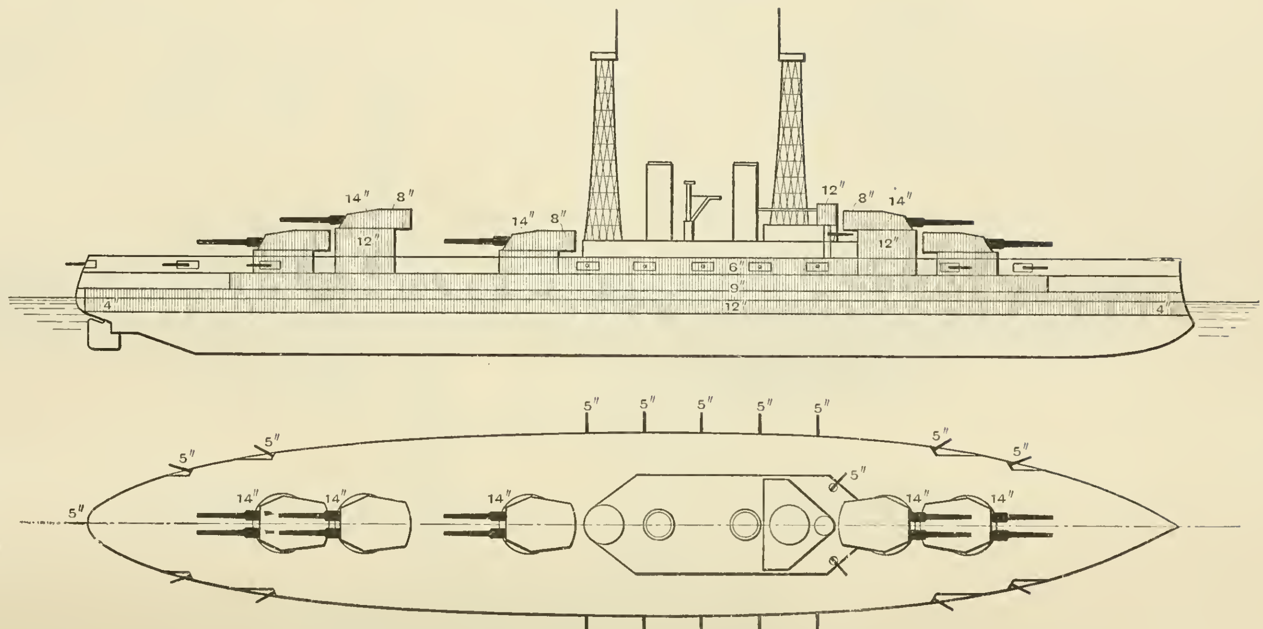


Length, 575 ft.; 27,500 tons ; Speed, 20·5 knots ; Completed, 1915 ;
Armament, 10—14 in. ; there are now 12—5 in., 2—3 in. A.A., 22 small.

UNITED STATES.

BATTLESHIPS.

New York. Texas.

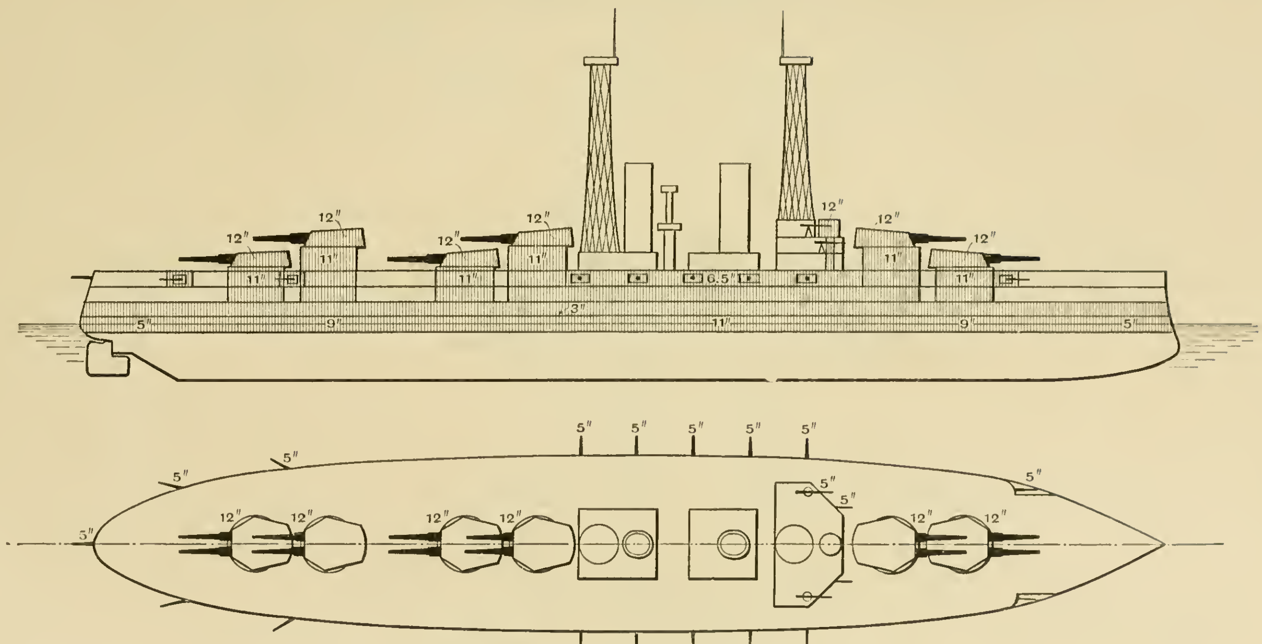


Length, 565 ft.; 27,000 tons; Speed, 21·5 and 21·1 knots; Completed, 1914;
Armament, 10—14 in. The secondary armament has been changed; there are 16—5 in. and 2—3 in. A.A., 17 small.

UNITED STATES.

BATTLESHIPS.

Arkansas. **Wyoming.**

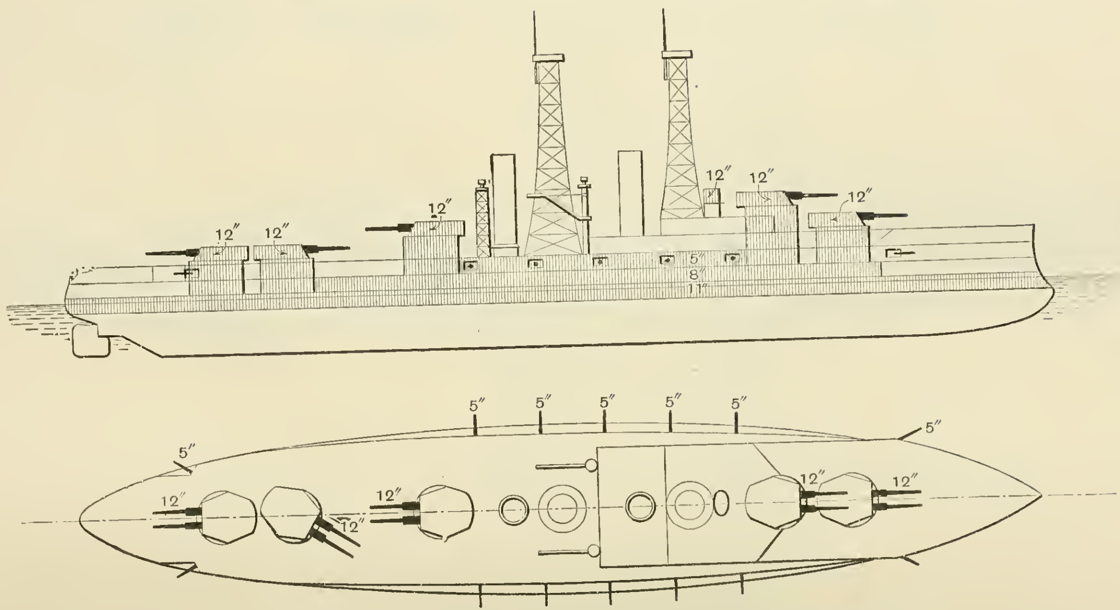


Length, 554 ft. ; 26,000 tons ; Speed, 21 knots ; Completed, 1912 ;
Armament : Arkansas, 12—12 in., 16—5 in., 2—3 in. A.A., 4—3 pr., and 5 smaller ;
Wyoming, 12—12 in., 16—5 in., 4—3 in. A.A., 4—6 pr., 17 smaller.

UNITED STATES.

BATTLESHIPS.

Delaware. North Dakota. Florida. Utah.

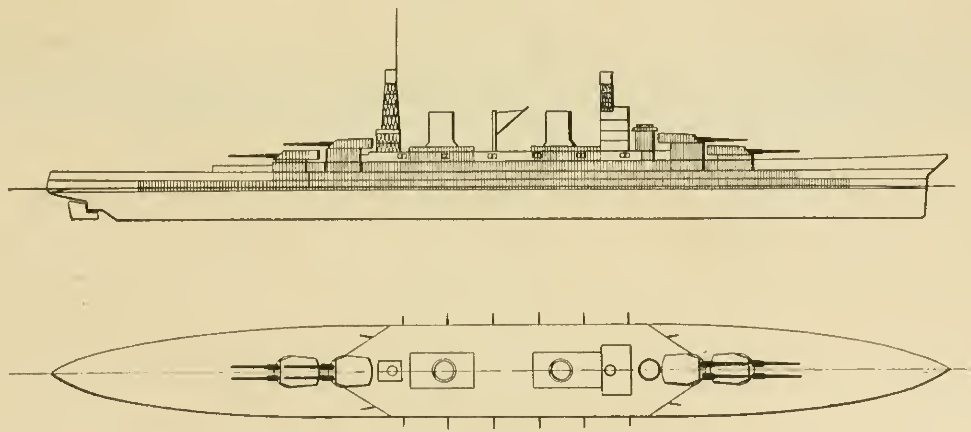


Delaware, North Dakota	Length, 510 ft. ; 20,000 tons ; Speed, 21 knots ; Completed, 1910 ; Armament, 10—12 in., 14—5 in., 2—3 in. A.A., 16 smaller.
Florida, Utah	Length, 510 ft. ; 21,825 tons ; Speed, 22·1 knots and 21·6 knots ; Completed, 1911 ; Armament, 10—12 in., now 16—5 in., 4—3 in. A.A., and 6 smaller.

UNITED STATES.

BATTLE CRUISERS.

Lexington. Constellation. Saratoga. Ranger. Constitution. United States.



Length, 850 ft.; 43,500 tons; Speed, 33·33 knots; Building;

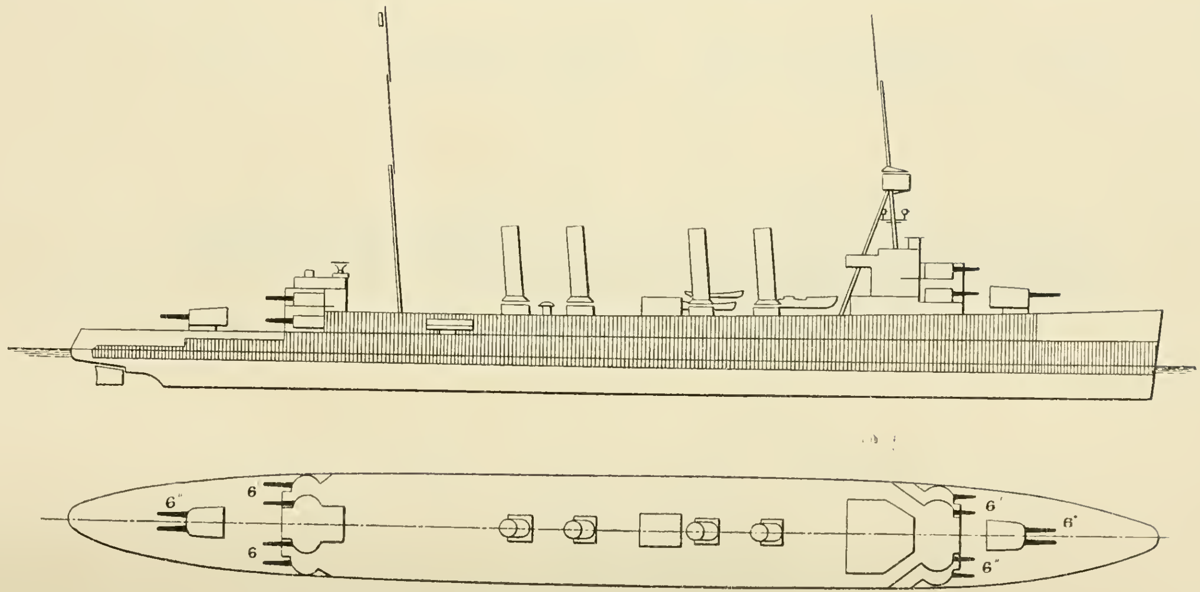
Armament, 8—16 in., 16—6 in., 4—3 in. A.A.; Torpedo Tubes, 8—21 in. (4 submerged).

Under the Treaty of Washington, (Chap. I., Art. III.) these battle-cruisers will not be carried forward, but the Lexington and Saratoga are to be converted and completed as aircraft carriers.

UNITED STATES.

SCOUT CRUISERS.

Cincinnati. Concord Detroit. Raleigh. Marblehead. Richmond. Memphis. Trenton. Milwaukee. Omaha.



Length, 550 ft. ; 7,500 tons ; Speed, 33·7 knots ; 1920, 1921, and Building.
Armament, 12—6 in., 2—14 pr. A.A., 2—3 pr.

BRITISH AND FOREIGN ORDNANCE TABLES.

VICKERS' GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 m/m Auto.	37 m/m Auto.	40 m/m Auto.	3-pdr. Semi-Auto.	6-pdr. Semi-Auto.	3-in. Semi-Auto.	4-in. Semi-Auto.	4-in. Semi-Auto.	4-in. B.L.	4·7-in. B.L.	4·7-in. B.L.	4·7-in. Q.F. Naval Howitzer.	5·118-in. B.L.	6-in. B.L.	6-in. B.L.	6-in. Semi-Auto.
		30 cal.	42·5 cal.	40 cal.	50 cal.	50 cal.	50 cal.	40 cal.	45 cal.	50 cal.	45 cal.	48·5 cal.	18 cal.	54 cal.	45 cal.	50 cal.	50 cal.
Construction . . .	ins.	S.	S.	S.	S.	S.	S.	S. & W.	S.& W.	S. & W.	S.& W.	S.	S.	S.	S. & W.	S. & W.	S. & W.
Diameter of Bore . .	ins.	1·457	1·457	1·575	1·85	2·244	3	4	4	4	4·724	4·724	4·724	5·118	6	6	6
Length of Bore . .	ins.	43·5	62	62	92·5	112·2	150	160	180	201·15	212·6	228·45	85	276·37	269·5	300	300
Length of Gun . .	ins.	73·75	94	95·7	98·9	118·6	157	166·6	187·8	208·45	220	236·2	89·9	281·5	279 228	310·07	311·17
		lb.	lb.	lb.	cwt.	c. q.	cwt.	cwt.	cwt.	cwt.	t. c.	t. c.	c. q.	t. c. q.	t. c. q.	tons	t. c.
Weight of Gun		432	551	616	6	9 1	19	25	43	42	3 4	3 2	11 1½	5 3 2	7 8 2	8	8 19
Weight of Projectile .	lb.	1	1·5	2	3·3	6	12·5	31	31	31	45	45·14	45	81·26	100	100	100
Muzzle Velocity . .	f.s.	1800	2100	2000	2800	2600	2700	2300	2700	3030	2800	3050	1200	2700	2900	3100	2900
Muzzle Energy . .	f.t.	22·5	46	55·5	180	280	630	1135	1565	1975	2415	2910	450	4110	5830	6665	5830
Penetration of Wrought Iron Plate at Muzzle, Gavre formula. Uncapped Projectiles	ins.	..	..	..	6·7	7·5	9·65	10·8	13·6	16	15·9	17·8	..	20·8	22·6	24·8	22·6
Rounds per minute . .		200	200	200	30	28	25	20	18	15	12	12	10	10	10	10	8
		lb.	lb.	lb.	c. q. lb.	c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q.	t. c. q. lb.	t. c. q.	t. c. q. lb	t. c. q. lb	t. c. q. l.	t. c. q. lb.	t. c. q.	t. c. q. lb
Weight of Mounting complete with Shield . .		800	800	1000	11 2 5	17 3 10	1 3 1 10	2 9 2 21	2 18 3	3 5 0 27	3 15 0	5 9 1 21	4 1 2 11	12 9 3 13	12 9 2 3	14 17 2	12 0 1 24
Weight of Shield . . .		..	..	..	1 0 20	1 2 10	2 0 14	7 2 0	7 2	14 1 13	15 2	1 12 2 0	2 0 0 4	4 4 3 16	4 4 3 16	6 5 0	5 5 1 15
Thickness of Shield .	ins.	..	..	..	·22	·25	·25	·144	·144	·25	·25	3	1·9	1·5 & 1	1·5 & 1	4 to 1·2	3 to 1·2
Angle of Elevation .	deg.	80	80	80	20	20	20	30	30	30	30	30	70	30	30	30	15
Angle of Depression .	deg.	10	10	5	10	10	10	10	10	10	10	10	5	5	5	7	7

		8-in. B.L.	9·2-in. B.L.	9·2-in. B.L.	10-in. B.L.	10-in. B.L.	11-in. B.L. Naval Howitzer.	12-in. B.L.	12-in. B.L.	13·5-in. B.L.	14-in. B.L.	14-in. B.L.	15-in. B.L.	15-in. B.L.	16-in. B.L.	16-in. B.L.	16-in. B.L.
		48·52 cal.	45 cal.	50 cal.	45 cal.	48·6 cal.	8 cal.	45 cal.	50 cal.	45 cal.	45 cal.	50·42 cal.	40 cal.	45 cal.	40 cal.	43·65 cal.	45 cal.
Construction		S.	S. & W.	S. & W.	S. & W.	S.	S.	S. & W.	S. & W.	S. & W.	S. & W.	S.	S. & W.	S. & W.	S. & W.	S.	S. & W
Diameter of Bore . .	ins.	8	9·2	9·2	10	10	11	12	12	13·5	14	14	15	15	16	16	16
Length of Bore . .	ins.	388·2	414	461·4	450	486	88	540	600	607·5	630	705·88	600	675	640	698·45	720
Length of Gun . .	ins.	400	427·03	471·4	464·6	500	96·6	557·55	617·7	625·9	648·4	728	620·3	695·3	661·25	720	741·25
		t. c. q.	t. c. q.	t. c. q.	t. c.	t. c.	t. c.	t. c.	t. c.	t. c. q.	t. c.	tons	t. c.	tons	tons	t. c.	tons
Weight of Gun		14 3 1	26 11 3	28 6 2	34 17	27 17	1 18	57 14	66 14	76 12 1	83 9	82	82 10	97	100	107 14	117
Weight of Projectile .	lb.	247·4	380	380	500	496·6	350	850	850	1400	1488	1648	1900	1900	2240	2461·2	2240
Muzzle Velocity . .	f.s.	3000	2800	2900	2780	2863	585	2850	3010	2500	2525	2700	2350	2500	2350	2500	2450
Muzzle Energy . .	f.t.	15440	20660	22160	26800	28225	682	47875	53400	60675	65790	83505	72750	82340	85780	106665	93230
Penetration of Wrought Iron Plate at Muzzle. Gavre Formula. Uncapped Projectile .	ins.	33·2	35·3	37	38·9	40·2	—	48·3	52·1	50	51·5	60·7	51	56	54	63	57
Rounds per minute . . .		6	4	4	3	3	4	2	2	1·5	1·35	1·35	1·2	1·2	1·2	1·2	1·2

Corrected to August, 1922

VICKERS' GUNS AND MOUNTINGS.

AIRCRAFT AND ANTI-AIRCRAFT GUNS.

—	Aircraft.									Anti-Aircraft.							
	·303-in. Auto.	·5-in. Auto.	1-in. Auto.	37 m/m. 1-pdr. Auto.	40 m/m. 2-pdr. Auto.	37 m/m. Semi-Auto.	40 m/m. Q.F.	40 m/m. Semi-Auto.	6-pdr. Q.F.	37 m/m. 1-pdr. Auto.	37 m/m. 1·5-pdr. Auto.	40 m/m. 2-pdr. Auto.	3-pdr. Semi-Auto.	3-in. Q.F.	3·3-in. Q.F.	4-in. Q.F.	4-in. B.L.
	93·7 cal.	60 cal.	30 cal.	22 cal.	42·5 cal.	26·1 cal.	25·1 cal.	40 cal.	25 cal.	30 cal.	42·5 cal.	40 cal.	50 cal.	45 cal.	50 cal.	45 cal.	50 cal.
Construction	S.	S.	S.	S.	S.	S.	S.	S.	S.	S.	S.	S.	S.	S. & W.	S. & W.	S. & W.	S. & W.
Diameter of Bore . . ins.	·303	·5	1	1·457	1·575	1·457	1·575	1·575	2·244	1·457	1·457	1·575	1·85	3	3·3	4	4
Length of Bore . . ,,	28·4	30	30	32·05	62	38·06	39 56	63	56·1	43·5	62	62	92·5	135	165	180	200
Length of Gun . . ,,	41·3	46·5	55	59·7	108	40·25	41·75	65·25	59·5	73·75	94	95·7	98·9	140·25	170·3	187 8	208·45
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	cwt.	c. q.	t. c. q.	t. c.	t. c. q.
Weight of Gun	30	50	110	130	400	110	132	234	284	432	551	616	6	18 3	1 13 2	1 18	2 1 3
Weight of Projectile . . lb.	174 grs.	570 grs.	·441	1	2	1·5	2	2	6	1	1·5	2	3·3	12·5	21	31	31
Muzzle Velocity . . . f.s.	2400	2600	1542	1200	2000	1200	1200	2300	1200	1800	2100	2000	2800	2600	2400	2700	3030
Muzzle Energy . . . f.t.	1	3·8	7·25	10	55·5	15	20	73	60	22·5	46	55·5	180	585	840	1565	1975
Rounds per minute . . .	500 to 1000	300 to 1000	200	150	100	—	—	—	—	200	200	200	30	25	20	18	15
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	c. q. l.	t. c. q. l.	t. c. q. l.	—	t. c. q. l.
Weight of Mounting . . .	—	25	65	100	140	333	130	432	185	800	800	1000	18 2 3	2 8 3 0	4 8 2 23	—	3 7 2 0
Angle of Elevation . deg.	—	80	40	60	72	30	70	60	60	80	80	80	80	85	85	—	80
Angle of Depression . ,,	—	30	90	60	30	30	40	30	90	10	10	5	5	10	0	—	5

HOWITZERS, FIELD, MOUNTAIN AND LANDING GUNS.

	Howitzers.				Field.					Mountain.		Landing.
	6-in. B.L.	8-in. B.L.	9·2-in. B.L.	12-in. B.L.	3-in. Q.F.	3-in. Q.F.	3 3-in. Q.F.	5-in. B.L.	6-in. B.L.	75-mm. Q.F.	3-in. Q.F.	3-in. Q.F.
	21 cal.	17·3 cal.	17·3 cal.	17·3 cal.	22·9 cal.	33·2 cal.	28·1 cal.	37 cal.	35 cal.	17 cal.	14·3 cal.	22 cal.
Construction	S. & W.	S. & W.	S. & W.	S. & W.	S. & W.	S.	S. & W.	S. & W.	S. & W.	S.	S.	S.
Diameter of Bore . ins.	6	8	9·2	12	3	3	3·3	5	6	2·953	3	3
Length of Bore . ins.	126	138·4	159·16	207·6	68·7	99·5	92·735	185	210	50·2	42·94	66
Length of Gun . ins.	134·15	148·3	170·51	222·35	73·26	103·8	96·96	192·25	219·22	53·6	47·28	70 34
	t. c. q.	t. c.	t. c. q.	t. c. q.	c. q.	c. q.	c. q.	t. c. q.	t. c. q.	c. q. l.	c. q. l.	c. q. l.
Weight of Gun . . .	1 19 2	3 7	4 5 2	9 2 2	6 0	7 2	8 2	2 3 1	4 11 2	3 1 10	2 2 4	3 3 4
Weight of Projectile lb.	86	200	290	750	15	14·33	18 5	60	100	14·33	12·5	12·5
Muzzle Velocity . f.s.	1760	1520	1520	1520	1480	1660	1650	2200	2400	1312	1150	1640
Muzzle Energy . f.t.	1845	3265	4645	12015	228	274	350	2015	3995	171	115	233
Rounds per minute . .	3	2	2	1	25	25	20	4	3	18	15	25
Weight of Mounting complete with Shield .	t. c. q. 2 16 2	t. c 5 14	t. c. 11 5	t. c. 36 10	c. q. l. 14 2 14	c. q. l. 14 0 0	c. q. l. 19 2 0	t. c. q. 2 17 0	t. c. q. 5 12 0	c. q. l. 11 3 18	c. q. l. 7 1 6	c. q. l. 9 2 0
Weight of Shield . . .	—	—	—	—	1 2 0	1 0 15	1 3 0	—	—	1 0 12	2 17	1 1 15
Thickness of Shield ins.	—	—	—	—	·125	·144	·125	—	—	·125	·125	·192
Angle of Elevation deg.	42	45	50	65	30	16	37·5	42	38	50	25	23
Angle of Depression deg.	0	0	0	0	5	10	5	0	0	10	15	10

Corrected to August, 1922.

ELSWICK B.L. AND Q.F. GUNS.

This Table is supplied by the Manufacturers.

	Automatic for Aircraft.				Semi-Automatic.			Semi-Automatic.	Non-recoil.		Naval Landing.	Anti-Air-craft.	Anti-Air-craft.	Semi-Automatic	Jointed Gun.		Semi-Automatic		
Diameter of Bore ....ins.	1·457	1·457	0·9	1·85	1·85	1·85	2·24	2·24	2·24	2·953	3	3*	3	3	3	4	4	4·7	4·7
do. do. ....mm.	37	37	22·86	47	47	47	57	57	57	75	76	76	76	76	76	102	102	120	120
Length of Bore ....cals.	45	40	66	40	46	50	40	50	27	14·13	18 8	28	50	50	19·2	50	40	45	50
	lb.	lb.	lb.	cwts.	cwts.	cwts.	cwts.	cwts.	lb.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
Weight of Gun	340	230	230	4·51	5 0	7·5	7·5	10·5	329	1·875	4	8	19	23	4·5	42	27	53	66
do. do. ....kilos.	154	104	104	230	254	381	381	533	149	95	203	406	978	1168	229	2131	1360	2692	3353
do. Projectile ....lbs.	1·5	1·5	6 oz.	3·3	3·3	3·3	6	6	6	11·75	12·5	12·5	12·5	14·33	14·33	31	31	45	45
do. do. ......kilos.	0·681	0·681	0·17	1·5	1·5	1·5	2·722	2·722	2·72	5·33	5·67	5·67	5·67	6·5	6·5	14·06	14·06	20·41	20·41
	oz.	oz.	oz.	oz.	oz.	lb. oz.	oz.	lb. oz.	oz	oz.	oz.	lb.	lb. oz.	lb.	ozs.	lb.	lb.	lb. oz.	lb.
do. Charge, M.D. Cordite	2½	2½	1½	8·25	10·0	1 0	10	1 2·5	7¾	7·75	15	1·1	3 2½	5·75	15	10·5	5·0	9 11	14
do. do. do. kilos.	0·071	0·071	0·042	0·234	0·283	0·453	0·283	0·525	0·22	0·22	0·369	0·5	1·43	2·608	0·425	4·76	2·27	4·395	6·35
Muzzle Velocity ....f.s.	2035	2000	2800	2132	2300	2680	1968	2400	1000	1100	1585	1640	2700	3050	1485	3000	2300	2600	3000
do. do. ......m.s.	620	609	853	650	701	817	600	731	305	335	483	500	823	930	452	914	701	792	914
Muzzle Energy ....f.t.	43	41·6	20·4	104	121	164	161	240	41·6	98	213	233	632	922	218	1934	1137	2109	2808
do. do. ....m.t.	13·3	12·8	6·3	32·2	37 5	50·8	49·8	74·3	12·8	30·3	66	72	196	285·5	67·5	599	352	653	869·6
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	3·5	3·4	3·6	5·15	5·8	7 3	5·4	7·3	1·95	..	..	5·1	10·8	13 7	..	17·4	11 6	15·6	19·3
do. do. ...mm.	88·9	86·3	91·4	130·8	147·3	185·4	137·2	185·4	49·5	..	..	129·5	274	348·0	..	442·0	294·6	396·2	490·2
Rounds per Minute	70	70	80	25	30	30	25	30	..	20	20	20	20	25	15	12	20	12	12

Diameter of Bore ....ins.	5	5·5	6	6	7·5	7·5	8	8	9·2	9·2	10	10	12†	12†	13·5	14†	15	15	16	18
do. do. ....mm.	127·2	139·7	152	152	190	190	203	203	234	234	254	254	305	305	343	355·6	381	381	406	457
Length of Bore ....cals.	45	50	45	50	45	50	45	50	45	50	45	50	45	50	45	45	40	45	45	40
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	4·05	5·65	8·4	8·75	13·8	15 75	18·0	20·4	26·75	28·82	36·25	38·25	59·3	66·7	76	85	85	98·6	108	152
do. do. ....kilos.	4114	5740	8535	8890	14021	16003	18289	20727	27179	29289	36832	38864	60252	67770	77216	86364	86364	96118	109728	154440
do. Projectile ....lbs.	60	83	100	100	200	200	250	250	380	380	500	500	850	850	1250	1400	1920	1925	2130	3320
do. do. ......kilos.	27·2	37·6	45·36	45·36	90·72	90·72	113·4	113·4	172·37	172·37	226·8	226·8	385·55	385·55	567	635	871	873·2	966	1506
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	16	25·0	31	33·0	74	76	80	90	122	136	167	200	260	285	296	324	380	400	580	690
do. do. do. kilos.	7·25	11·34	14·061	15·0	33 566	34·473	36·29	40·82	55·34	61·7	75·75	90·72	117·93	129·3	134·26	147	172·3	181	263	313
Muzzle Velocity ....f.s.	2700	2900	2800	3000	2900	3000	2845	3000	2750	3000	2800	3000	2800	3000	2700	2700	2362	2500	2630	2400
do. do. ....m.s.	823	884	853	914	884	914	867	914	838	914	853	914	853	914	823	823	720	762	801·6	731
Muzzle Energy ....f.t.	3032	4840	5436	6240	11663	12481	14031	15600	19926	23714	27181	31203	46208	53046	63187	70770	74275	83425	102160	132600
do. do. ....m.t.	939	1499	1683·4	1932	3611·9	3865·2	4345·2	4831·2	6171	7340	8418	9663	14310	16428	19568	21916	23002	25835	31670	41065
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	18·4	25·8	22·9	25·5	30·6	32·3	32·2	34·9	35·2	40·1	39·7	44·1	47·3	52·5	51·3	53·2	49·1	53·7	58	60
do. do. ...mm.	724	701·0	581·6	647·7	777·2	820·4	817·9	886·4	894·1	1018·5	1008·4	1120·1	1201·4	1333·5	1362·0	1351·3	1247	1364	1473	1524
Rounds per Minute	10	10	9	9	6	6	5	5	4	4	3	3	2	2	2	2	2	2	2	2

Corrected to July, 1922.

* This gun can be arranged for anti-torpedo boat attack also.
† These guns can be used on Railway Truck Mountings.

ELSWICK HOWITZER, FIELD AND TRENCH GUNS.

This Table is supplied by the Manufacturers.

	Mountain Gun.	Field.	Horse and Field.	Field.			Howitzers.				Field Position.	Howitzers.						Bomb Thrower	Trench Howtzr.	Trench Howtzr.	Stick Bomb Thrower	Anti-Aircraft.	Tank.
Diameter of Bore ... ins.	2·953	3	3	3·3	3·3	4	3·75	4·5	4	4·7	5	6	8	9·2	11	11·24	12	13·5	11	5	3·5	3	2·244
,, ,, ... mm.	75	76	76	84	84	101·6	95·25	114·2	102	120	127	152	203	234	279·4	285·5	304·8	342·9	279·4	127	88·9	76·2	57
Length of Bore ... calibres	15·2	28	23	28	33	30	23	20	8·75	12	32	12·2	17	13·7	12	15	17.3	..	5	5·4	..	45	23
	lb.	cwt.	cwt.	cwt.	cwt.	tons	cwt.	cwt.	lb.	cwt.	tons	ton	tons	tons	tons	tons	tons.	lb.	lb.	lb.	lb.	cwt.	cwt.
Weight of Gun	260	7·25	6	9	9½	1·09	11·25	14·75	220	8	2	1	2·9	4·3	5·5	7·85	10·5	973	1481	252	863	20	5
,, ,, ... kilos.	118	368	305	457	483	1112	571	749	100	406	2032	1016	2950	4369	5588	7976	10,668	441	672	114	391	1016	254
,, Projectile lbs.	12·5	14·3	12·5	18·5	20½	31	27·5	35	20	35	60	100	220	290	500	661·38	750	200	200	40	200	12·5	6
,, ,, kilos.	5·67	6·49	5·67	8·39	9·3	14	12·5	15·87	9·07	15·87	27·22	45·36	100	131·5	227	300	340·2	90·7	90·7	18	90·7	5 6	2·722
	oz.	oz.	lb. oz.	lb. oz.	lb. oz.	lb.	lb. oz.	lb. oz.	oz.	lb. oz.	lb. oz.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	oz.	lb. oz.	lb. oz.	oz.
,, Charge M.D. Cordite	10	20½	1 4	1 6	1 9	4·75	2 5½	1 7	8½	1 4½	9 8	3	19·5	14	20	32	49	1¼	1	3½	2 10	2 10	8¼
,, ,, ,, kilos.	0·283	0·582	0·567	0·624	0·71	2·15	1·066	0·652	0·241	0·582	4·31	1·361	8·85	6·35	9·07	14·51	22·2	·6	454	·1	1·2	1·2	·248
Muzzle Velocity ... ... f.s.	1250	1755	1700	1635	1750	2000	1550	1450	950	1150	2150	1000	1550	1250	1220	1230	1470	380	400	429	355	2575	1580
do. do. ... m.s.	381	535	518	498	533	610	477·4	442	290	350	655	305	472·5	381	372	375	448	115·8	122	130·7	108·2	784·8	481·5
Muzzle Energy ....f.t.	..	..	..	..	..	..	...	..	..	..	..	..	..	..	..	..	11,238	200	222	51	174·7	574·7	103·9
do. do. ....m.t.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3480	61·9	68·7	15·8	54·1	178	32·2
Penetration at Muzzle ...ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·9	..	..	..	..	10·1	3·9
(Tressider Wrought Iron Pl.)																							
do. do. mm.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	429·2	..	..	..	..	256·5	99
Rounds per Minute............	..	..	..	..	20	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	20	25

Corrected to July, 1922.

BEARDMORE GUNS.

This Table is supplied by the Manufacturers.

(July, 1922.)

Gun Calibre.	Length of Bore.	Weight of Gun.	Weight of Shot.	Muzzle Velocity.
inches.	calibres.	tons. cwts.	lbs.	ft.-secs.
16·0	45·0	107 0 (all steel)	2100	2675
15·0	45·0	96 0	1850	2600
13·5	46·0	77 0	1375	2620
12·0	50·0	66 0	950	2820
9·2	50·0	28 10	425	2810
7·5	45·0	13 18	200	2800
6·0	50·0	8 14	100	2950
6·0	50·0	7 18 (all steel)	100	2950
6 0	45·0	6 18	100	2800
5·5	45·0	5 16	82	2650
5·0	50·0	4 6	60	2950
4·7	45·0	3 4	45	2750
4·0	50·0	2 3	31	3000
4·0	45·0	2 2	31	2800
3·3	29·9	0 9	18·5	1700
3·3	31·1	0 9 (all steel)	18·5	1760
3·0	40·0	0 12 (all steel)	12·5	2250
2·24	23·2	0 5 (all steel)	6	1525

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1913.	Model 1906.	Model 1902.	Model 1893–96.				Model 1893.				
Desig. by Calibre, in cms.	34	30·5	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4
Calibre, in inches	13·4	12·01	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..
Length of Bore, in cals.	45	50	45	40	40	45	45	35	40	40	40	40
Total weight, in tons	66	45	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6
Weight of Firing Charge, Armour-piercing Projectile . . . lb.	..	..	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1
Weight { Armour-piercing Projectile . lb.	1190	969	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3
Weight { Common Shell . ,,	..	..	..	750	562	375	190	925·9	643·8	476·2	317·5	165·3
Muzzle Velocity, in f.-s., A.P. Projectile	..	2871	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625
Muzzle Energy { Total, in f.-t.	65340	54343	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898
Muzzle Energy { Per in. circ., f.-t.	..	..	..	..	..	..	..	..	815·8	670·7	511·1	329·1
Perforation at Muzzle,† wrought iron, inches	..	..	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4
Perforation Krupp Steel, 3000 yds.	11·8 (9000 mètres)	..	15½	13½	11½	10½	6¾	11½	11	9	7½	5½

† By Tressidder's formula.

In the new cruisers a 19·4 cm. gun of a new pattern is intended to be mounted.

UNITED STATES NAVAL ORDNANCE.

GUN.	MARK.	Length in Calibres.	Total Length.	Capacity of Chamber in Cubic Inches.	Travel of Projectile in Inches.	Weight of Gun.	Weight of Projectile.	Weight of Charge.	Muzzle Velocity.	Muzzle Energy.	Penetration at Muzzle, Krupp Armour, using Capped Projectile.	At 3000 Yards. Remaining Velocity.	At 3000 Yards. Penetration.	At 6000 Yards. Remaining Velocity.	At 6000 Yards. Penetration.	At 9000 Yards. Remaining Velocity.	At 9000 Yards. Penetration.
			inch.			tons.	lb.	lb.	ft.-seconds.	ft.-tons.	inch.	ft.-seconds	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.
3-in. S.A.	V., VI.†	50	159	219	128·3	1·0	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
4-in. R.F.G.	III., IV., V., VI.	40	164	331	131·5	1·5	33	4·85	2000	915	3·4	1156	1·7	897	1·2	..	..
4-in. R.F.G.	VII.	50	205	652	168·3	2·6	33	9·0	2500	1,430	4·6	1432	2·2	979	1·4	853	1·2
4-in. R.F.G.	VIII.‡	50	205	652	168·3	2·9	33	12·3	2800	1,794	5·3	1627	2·6	1033	1·5	878	1·2
5-in. R.F.G.	II., III., IV.	40	206	656	165·8	3·1	50	10·0	2300	1,852	5·3	1286	2·6	934	1·7	829	1·4
5-in. B.L.R.	V., VI.	50	256	1,200	215·6	4·6	60	19·2	2700	3,032	6·2	1692	3·5	1102	2·0	928	1·6
5-in. B.L.R.	VI.	50	256	1,200	215·6	4·6	50[1]	20·5	3000	3,122	6·4	1732	3·2	1057	1·7	877	1·4
5-in. R.F.G.	VII.§	51	261	1,135	215·6	5·0	50	23·8	3150	3,439	6·8	1835	3·4	1091	1·8	895	1·4
6-in. R.F.G.	II., III.	30	196	1,287	150·0	4·8	105	18·8	1950	2,768	5·3	1305	3·2	1009	2·3	909	2·0
6-in. R.F.G.	IV., VII.	40	256	1,320	205·8	6·0	105	18·8	2150	3,365	6·0	1440	3·6	1058	2·4	934	2·1
6-in. R.F.G.	IX.	45	270	1,320	221·7	7·0	105	18·8	2250	3,685	6·3	1511	3·8	1086	2·5	948	2·1
6-in. B.L.R.	VI.	50	300	2,101	247·5	8·3	105	30·0	2600	4,920	8·6	1770	4·7	1207	2·9	996	2·2
6-in. B.L.R.	VIII.	50	300	2,101	247·5	8·6	105	37·0	2800	5,707	11·3	1923	5·2	1297	3·2	1026	2·3
7-in. B.L.R.	II.	45	323	3,643	259·8	12·7	165	58·0	2700	8,338	9·6	1948	6·4	1382	4·2	1083	3·0
8-in. B.L.R.	III., IV.	35	305	3,170	245·8	13·1	260	43·8	2100	7,948	8·6	1576	6·0	1206	4·2	1040	3·6
8-in. B.L.R.	V. and VI.	45	369	5,243	299·1	18·7	260	98·5	2750	13,360	12·0	2106	8·6	1589	6·1	1227	4·4
10-in. B.L.R.	I., II.	30	329	6,779	251·1	25·1	510	90·0	2000	14,141	10·7	1590	8·0	1274	6·1	1103	5·0
10-in. B.L.R.	III.	40	413	10,222	327·0	34·6	510	207·5	2700	25,772	19·4	2184	11·9	1747	9·0	1406	6·9
12-in. B.L.R.	I., II.	35	441	11,991	345·2	45·3	870	160·0	2100	26,596	14·2	1733	11·2	1433	8·8	1219	7·2
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	237·5	2400	34,738	19·8	1994	13·3	1649	10·5	1376	8·3
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	305·0	2600	40,768	18·5	2171	14·8	1801	11·7	1500	9·3
12-in. B.L.R.	V.	45	553	16,974	452·0	52·9	870	305·0	2700	43,964	19·4	2259	15·5	1877	12·3	1561	9·8
12-in. B.L.R.	VI.	45	553	14,970	452·0	53·6	870	340·0	2850	48,984	20·8	2393	16·6	1991	13·3	1653	10·6
12-in. B.L.R.	VII.	50	607	14,296	506·3	56·1	870	340·0	2950	52,483	25·7	2483	17·5	2071	13·9	1719	11·0
13-in. B.L.R.	I., II.	35	479	15,068	374·9	61·4	1130	180·0	2000	31,333	15·0	1679	12·0	1414	9·7	1221	8·1
14-in. B.L.R.	I.[1]	45	642	..	..	63·6	1400	365·0	2600	65,606	39·7*	..	23·4*	..	..	.	.
14-in. B.L.R.	II.[2]	50	700	..	..	82·2	1400	..	2800	76,180	44·1	..	27·4	..	.	..	..

[1] Pennsylvania class. [2] New Mexico class. For the 15-in. and 16-in. guns see the Bethlehem table, page 380.

* De Marre formula. † A short anti-aircraft 3-in. gun is mounted in many of the ships. ‡ There is now a 4-in. 50-cal. anti-aircraft gun

§ All battleships from the Delaware class onward have this gun for torpedo defence.

Corrected to 1922.

BETHLEHEM STEEL CO.

ORDNANCE.

Table supplied by the Manufacturers, June, 1922.

Calibre.		Length of bore.	Weight of gun, including breech mechanism.		Weight of projectile.		At Muzzle. Velocity.		At Muzzle. Energy.		At Muzzle. Penetration of steel-plate (De Marre).		Ammunition.
inches.	millimetres.	calibres.	lbs.	kgs.	lbs.	kgs.	ft. per sec.	metres per sec.	foot-tons.	metre-tons.	inches.	milli-metres.	Type.
1·457	37	about {50	160	72·5	1·07	0·48	2,150	655	34	10·5	2·04	51·8	Fixed in cartridge case.
1·850	47	about {50	550	249·5	3·3	1·5	2,400	732	132	41	4·11	104·4	,, ,,
2·244	57	50	960	435·5	6·07	2·75	2,400	732	243	75	5·17	131·3	,, ,,
3	76·2	50	1950	884 5	13	5·9	2,700	823	658	204	7·71	195 8	,, ,,
			tons.										
4	101·6	50	2·6	2,642	33	15	2,800	853	1,795	557	11·61	294·9	,, ,,
4	101·6	50	2·6	2,642	30·86	14	3,000	914	1,928	597	12·22	310·4	,, ,,
5	127	51	5·0	5,080	50	22·7	3,150	960	3,440	1,067	14·56	369·8	Separate, with powder in bag.
6	152·4	45	7·0	7,112	105	47·6	2,600	792	4,926	1,523	15·47	392·9	Separate, with cartridge case.
6	152·4	50	8·4	8,534	105	47·6	2,800	853	5,713	1.767	17·19	436·6	Separate, with powder in bag.
6	152·4	53	10·1	10,262	105	47·6	3,000	914	6,559	2,028	18·97	481·8	,, ,, ,,
7	177·8	45	12·7	12,903	165	74 8	2,700	823	8,348	2,584	19·11	485·4	,, ,, ,,
7	177·8	50	14·5	14,732	165	74·8	2,900	884	9,631	2,982	21·16	537·5	,, ,, ,,
8	203·2	45	18·6	18,898	260	118	2,800	853	14,148	4,379	24·15	613·4	,, ,, ,,
8	203·2	50	22·3	22,657	260	118	2,900	884	15,177	4,703	25·38	644·6	,, ,, ,,
9·2	233·7	50	30·4	30,886	380	172	2,900	884	22,181	6,856	28·66	727·9	,, ,, ,,
10	254	45	35·4	35,966	515	234	2,800	853	28,023	8,685	30·97	786·6	,, ,, ,,
10	254	50	43·9	44,602	515	234	2,900	884	30,061	9,327	32·56	827 0	,, ,, ,,
12	304·8	45	53·8	54,660	870	395	2,800	853	47,341	14,660	37·05	941·1	,, ,, ,,
12	304·8	50	66·0	67,056	870	395	2,900	884	50,783	15,745	38·95	989·3	,, ,, ,,
14	355·6	45	66·0	67,056	1,400	635	2,600	792	65,687	20,317	39·69	1008·0	,, ,, ,,
14	355·6	50	80·0	81,280	1,400	635	2,800	853	76,181	23,567	44·12	1121	,, ,, ,,
15	381	45	86·5	87,884	1,700	771	2,600	792	79,763	24,668	42·35	1076	,, ,, ,,
16	406·4	45	105·0	106,680	2,100	953	2,600	792	98,530	30,491	45·95	1167	,, ,, ,,
16	406·4	50	128·0	130,048	2.100	953	2,800	853	114,272	35,369	51·08	1297	,, ,, ,,
16	406·4	50	140·0	142,400	2,330	1,057	2,700	823	117,900	36,500	52·39	1331	,, ,, ,,
18	457·2	45	150·0	152,400	3,330	1,510	2,450	747	138,734	42,979	51·71	1331	,, ,, ,,

Guns of 3-in. calibre and under, equipped with the wedge-type breech mechanism, are supplied with an automatic breech-opening device, if desired.
A new type of 16-in 50-calibre gun, with heavier projectile, is included in this list.

GERMAN SHIP AND COAST GUNS (KRUPP).

This list of Krupp guns was corrected in September, 1921. It is preserved here as a record of the guns which were produced at Essen shortly before the war, and during its course up to the time when the provisions of the Armistice came into force. Under the Peace Treaty the delivery of German war material abroad is interdicted. The most important of the new guns were those of heavy calibres: 16 in., 18 in. and 20 in. The pre-war table showed no guns of greater length than 40 calibres below the 11 in. The Essen Company always attached the greatest importance to the endurance and performances of its heavy guns. The light cruiser which has been laid down at Wilhelmshaven will have 6-in. or 5·9-in. guns.

Calibre . . . . cm.	7·5 = 2·9 in.		8·8 = 3·4 in.		10·5 = 4·1 in.		15 = 5·9 in.		21 = 8·2 in.		24 = 9·4 in.		28 = 11 in.	
Length of Bore . . . . cals.	45	50	45	50	45	50	45	50	45	50	45	50	45	50
Length of Bore . . . . mm.	3375	3750	3960	4400	4725	5250	6710	7455	9420	10465	10800	12000	12600	14000
Total Length . . . . ,,	3570	3945	4190	4630	5000	5525	7100	7845	9965	11010	11425	12625	13330	14730
Weight of Gun . . . . kg.	760	780	1225	1260	2095	2140	5970	6120	14600	15440	21950	23250	34900	36900
Weight of Projectile . . ,,	5·8	5·8	9·5	9·5	16	16	46	46	125	125	190	190	300	300
Weight of Charge . . . ,,	1·84	1·84	2·97	2·97	5·05	5·05	14·4	14·4	38·8	38·8	58·3	58·3	92·7	92·7
Muzzle Velocity . . . m/sec.	850	875	850	875	850	875	850	875	850	875	850	875	850	875
Muzzle Energy . . . . mt.	213·5	226·5	350	371	590	625	1694	1797	4610	4880	7000	7420	11040	11700
Muzzle Penetration (Steel) mm.	206	215	247	258	297	310	433	452	616	642	717	747	842	878

Calibre . . . . cm.	30·5 = 12 in.		35·56 = 14 in.		38·1 = 15 in.		40·64 = 16 in.		45·72 = 18 in.		50·8 = 20 in.	
Length of Bore . . . . cals.	45	50	45	50	45	50	45	50	44	50	45	50
Length of Bore . . . . mm.	13725	15250	16000	17780	17145	19050	18290	20320	20575	22860	22860	25400
Total Length . . . . ,,	14520	16045	16925	18705	18135	20040	19345	21375	21765	24050	24180	26720
Weight of Gun . . . . kg.	45100	47700	70000	75200	86100	92500	104300	112200	148300	159500	204000	219000
Weight of Projectile . . . ,,	390	390	620	620	760	760	920	920	1310	1310	1805	1805
Weight of Charge . . . ,,	120	120	190	190	233	233	284	284	402	402	553	553
Muzzle Velocity . . . . m/sec.	850	875	850	875	850	875	850	875	850	875	850	875
Muzzle Energy . . . . mt.	14350	15230	22800	24200	27950	29650	33900	35950	48250	51200	66500	70500
Muzzle Penetration (Steel). mm.	927	967	1095	1142	1177	1227	1259	1312	1428	1488	1600	1668

SIZE AND FIGHTING QUALITIES OF BRITISH BATTLESHIPS OF DIFFERENT PERIODS.

Name.	Date of Completion.	Displacement.	Side Armour.	Speed.	Total Weight of Shot in One Round.	Collective Energy at Muzzle of One Round.
		tons.	in.	knots.	lb.	foot-tons
Warrior	1861	9,210	4½-in. wrought-iron	14½	3,800	61,476
Hercules	1868	8,680	9-in. to 6-in. wrought-iron	14	5,400	70,200
Alexandra	1877	9,490	12-in. to 6-in. wrought-iron	15	5,426	71,400
Inflexible	1881	11,880	24-in. to 16-in. wrought-iron	13	6,936	123,120
Benbow	1888	10,600	18-in. compound	16·75	4,600	135,560
Royal Sovereign	1892	14,150	18-in. and 5 in. compound	17·5	5,800	159,610
Barfleur	1894	10,500	12-in. compound	18·5	2,450	67,670
Canopus	1900	12,950	6-in. hardened steel	18·25	4,600	178,720
Prince of Wales	1902	15,000	9-in. super-hardened steel	18·25	4,600	194,400
King Edward VII.	1905	16,350	9-in. hardened steel	19	6,100	271,800
Dreadnought	1906	17,900	11-in. hardened steel	21	8,800	487,100
Neptune	1911	20,600	12-in. hardened steel	21·5	8,900	545,000
Ajax	1913	25,000	12-in. hardened steel	21·5	14,500	625,000
Queen Elizabeth	1914	27,500	13-in. hardened steel	25	{ about 16,400 }	710,000

PARTICULARS OF SUCCESSIVE LARGE BRITISH NAVAL GUNS, 1800 TO 1921.

Year.	Type.	Weight.		Length.	Calibre.	Weight of Projectile.	Weight of Charge.	Muzzle Energy.	Penetration of Wrought-Iron at 1000 yards range.
		tons.	cwt.	in.	in.	lb.	lb.	ft.-tons.	in.
1800	Cast-iron smooth-bore . .	2	12	114	6·4	32	10	400	—
1842	Ditto	4	15	—	8·12	68	16	700	—
1865	Woolwich wrought-iron .	4	10	—	7	115	22	1,400	7
1870	Built-up muzzle-loader . .	38	0	200	12·50	810	200	13,900	17
1880	Ditto	80	0	321	16	1700	450	27,960	22½
1887	Built-up breech-loader . .	110	10	524	16·25	1800	960	54,390	32
1895	Wire-wound breech-loader .	46	0	445·5	12	850	—	33,940	34·6
1900	Ditto	51	0	496·5	12	850	210	36,290	35·4
1905	Ditto	58	0	558	12	850	—	47,700	46·2
1912	Ditto	76	0	626	13·5	1400	—	60.600	*50
1914 to 1920	Ditto	97	0	675	15	1900	—	82.300	*56
1921	Ditto	117	0	720	16	2240	—	93,230	*57

* At muzzle. Guns of 18-in. calibre were fitted to one cruiser during the War, but were subsequently removed and used in monitors.

FIRST LORD'S STATEMENT EXPLANATORY OF THE NAVY ESTIMATES, 1922–1923.

As a result of the Washington Conference * and concurrent administrative economies, the *Effective* Naval votes for 1912–23 have been reduced by nearly 21 millions net (£20,791,000) as compared with 1921–22.

The total of these votes (£54,774,200), moreover, includes the re-vote of a sum of £450,000 which was provided in last year's Estimates for the liquidation of certain war claims, the settlement of which depends on legal or arbitration proceedings. It had been anticipated that these claims would have been adjudicated and settled before March 31, but this has not been found possible.

On the other hand, the *Non-effective* votes (*i.e.*, those for pensions, retired pay, etc.) have increased by £3,195,800, as compared with 1921–22, the increase being almost entirely due to the special provision, amounting to £3,000,000 (necessarily a rough estimate) for probable charges by way of pensions and retiring gratuities to the great number of Officers and Men and Dockyard Employees (amounting to over 30,000 in all) who are to be reduced this year.

It will be remembered that the (Geddes) Committee on National Expenditure referred to these as "aftermath" charges, to be met out of "Special Revenue," and, in making their recommendations for cutting down the Estimates, emphasised the fact that "no account is taken of any abnormal increase in the Non-effective Votes, caused by a reduction of the personnel transferred to the Retired List."

Taking this into consideration (and after making the necessary deductions for increases in prices, wages, etc.), the *Effective* votes for 1922–23 show a net reduction, as compared with 1914–15, of over 24 millions, or, approximately, 50 per cent.

Naval Policy.

As stated last year, Estimates can only be based upon Policy, and the Naval Policy of the Government, as approved by Parliament and implemented at Washington, is to maintain a "One-Power Standard"—*i.e.*, that our Navy should be not inferior in strength to that of any other Power. The duty of the Admiralty is to carry out that policy, with the strictest regard to economy, giving the utmost weight to the changed and improved international conditions which have resulted from the Washington Conference. Indeed, the Admiralty have gone further in accepting drastic economies, and

* These Estimates have been prepared on the assumption that the Naval Treaty concluded at Washington will be effectively ratified by all the signatory Powers.

consequent risks, which could only be justified on the assumption that the British fleet will not be engaged in any great war for many years to come. On purely Naval grounds such an assumption could not be justified, but both the financial and the international situation call for an exceptional response, and this the Admiralty have made, although they realise that, in this matter, a very grave responsibility is imposed upon them.

Proposed Economies.

A summary of the economies proposed, or already being effected, will be found in the accompanying Memorandum. The details will, of course, be set forth in the Votes; but it may be here mentioned that they include:—

(*a*) The scrapping of 12 capital ships, in addition to the 8 recently sold for breaking up, and the maintenance of only 15 in full commission (as compared with 38 in March, 1914).

(*b*) The further reduction of the Destroyer Flotillas of the Atlantic Fleet.

(*c*) The abolition of 27 Submarines and the reduction of the number in full commission.

(*d*) The abolition of two of the Home Commands (Coast of Scotland and Western Approaches).

(*e*) The reduction of the personnel of the Fleet, during 1922–23, by over 20,000 Officers and Men.

(*f*) The discharge of over 10,000 men from the Royal Dockyards, and a drastic reduction of Civil Staffs at the Admiralty and other Establishments.

(*g*) The rigorous pruning of all other services and Votes.

New Construction.

As already announced, the building of the four battle-cruisers which had been sanctioned and commenced last year, has now been abandoned and no provision is made in these Estimates for any new programme beyond the laying down, early in 1923, of the two smaller battleships which are specified in the Naval Treaty concluded at Washington. Under the terms of that Treaty, no further capital ships can be laid down by the British Empire before the expiration of ten years from November 12, 1921.

The other restrictions on the building, size, and armament of new vessels of war are fully set forth in the Treaty, and will obviate the great increases in expenditure with which all the great Naval Powers would, otherwise, have been faced in the near future—not only for shipbuilding but for the development of docks, harbours, etc., to accommodate the rapidly growing size of individual ships.

The Washington Conference.

These economies, of course, can only be realised, and the present Navy Estimates justified, on the assumption that the Naval Treaty

concluded at Washington will be promptly ratified by all the Powers concerned.

Of this outcome I feel as confident as I did twelve months ago, when, in my previous annual statement, I expressed the hope that "as a result of frank and friendly discussion with the principal Naval Powers" it would be possible "to avoid anything approaching to competitive building, either now or in the future."

The anticipation has now been largely realised, and a new era of hope ushered in for an impoverished and war-weary world.

LEE OF FAREHAM.

Admiralty,
March 10, 1922.

MEMORANDUM.

(Supplemental to the Explanatory Statement.)

The Estimates for 1922–23 provide the following comparison with the corresponding Estimates for 1921–22:—

	Gross.	Net.
1921–22	£91,554,869	£82,479,000
1922–23	£68,950,000 (approx.)	£64,883,700
Reduction . .	£22,604,869	£17,595,300

(The 1921-22 figures *exclude* the Supplementary Estimate due to calling out the Royal Fleet Reserve for service in the national emergency which arose in the early months of 1921–22.)

FLEET NUMBERS AND COMPOSITION OF THE FLEET.

Although the numbers to be voted are necessarily the maximum numbers which will be borne at the very beginning of the year, the Estimates provide for the reduction of the personnel of the Fleet to 98,500 as rapidly as possible.

A reduction of 20,000 Officers and Men has to be effected during the year.

There will also be a considerable decrease in the numbers of the Coast Guard.

CAPITAL SHIPS.

Of the twenty completed Capital Ships to be scrapped under the terms of the Washington Naval Treaty, nine have already been so disposed of. Eleven remain to be scrapped, including H.M.A.S. Australia. It is also intended to scrap the Battleship Collingwood, the retention of which for non-combatant purposes was sanctioned by the Treaty but is no longer necessary.

In addition, the Battle Cruiser Renown will be put into Reserve on the conclusion of her present cruise with H.R.H. The Prince of Wales.

The main Atlantic Fleet will then consist of one Fleet Flagship; two divisions of Battleships, each composed of four ships, and two Battle Cruisers. Any reduction in these numbers would be incompatible with the maintenance of the tactical efficiency of the Fleet. The Mediterranean fully-commissioned Fleet consists of only four Battleships, every unit of which is continually employed. Apart from the question of tactical efficiency, the Admiralty are satisfied that the number of Capital Ships to be retained in commission is the minimum necessary for the training of personnel, both Officers and Men.

LIGHT CRUISERS (ATLANTIC FLEET).

The number of Light Cruisers attached to the Atlantic Fleet is based primarily on tactical requirements, which in their turn are based upon war experience. But these Cruisers are also in constant demand for showing the Flag, and for political cruises in the Baltic and Northern and Western European Waters and Atlantic Islands, and are frequently detached from the Fleet for long periods. For this

reason, and owing to the incidence of refits, it has often happened during the last two years that out of the 1st and 2nd Light Cruiser Squadrons not more than three or four vessels have been present with the Fleet when it is carrying out important exercises.

Light Cruisers (Foreign Stations).

The Light Cruiser strength of the African Squadron will be reduced to two ships by keeping the Birmingham in reserve at home.

In considering the number of Light Cruisers retained in commission it has been necessary to bear in mind that the Light Cruisers abroad are required to carry out a great variety of duties in peace. Apart from the general stimulus which their presence gives to British prestige and British trade in foreign countries, their services are frequently requisitioned for the direct protection of British interests or maintenance of order.

Moreover, from the Naval point of view these Squadrons are well placed for taking up their war stations, and afford invaluable opportunities to Officers and Men of becoming acquainted with waters which, at some future date, might be the principal theatre of Naval operations.

Destroyers.

One of the Destroyer Flotillas belonging to the Atlantic Fleet was, for financial reasons, reduced to two-fifths complement last year. In view of the urgent need for economy, another Flotilla will now be similarly reduced.

The total number of Destroyers in full complement with the Atlantic Fleet is thus brought down to 40—the smallest number which can provide for the vital part played by Destroyers in all modern Fleet exercises and for the training of Officers and Men.

Twenty-three Destroyers of the Local Defence Flotillas, now on a reduced complement, will also be reduced to reserve.

Submarines.

The total number of Submarines previously maintained was 85. It has been decided to abolish 27 of these. The number of Submarines in full commission will also be reduced from 46 to 40, six Submarines on the China Station being kept in reserve.

Other Types of Vessels.

These have been exhaustively reviewed, and reductions have been made wherever possible. But it must be remembered that one of the main lessons of the war was the importance in modern Naval warfare of various auxiliary vessels, *e.g.*, Minesweepers, Minelayers, Anti-submarine craft, etc., with which our Navy, in common with other Navies, was ill-equipped before the war. Any calculation, therefore, of requirements in these respects which is based on the 1914 standard cannot properly apply either to our Navy or to any other modern Navy.

H.M. the King has approved of the giving up of H.M. Yacht Alexandra in order that the cost of her maintenance (about £26,000 a year) may be saved.

The Admiralty Yacht, Enchantress, is also being given up, with a consequent saving of £28,000 a year, and all expenditure upon her terminated. The Special Service vessels Surprise (Mediterranean) and Alacrity (China) are also being abolished.

Commands.

Two Home Commands—the Coast of Scotland and the Western Approaches—will be abolished.

Reduction of Complements.

The Admiralty have come to the conclusion that the improved international situation now makes it possible to reduce, in peace, the complements of the ships of the Atlantic Fleet below the establishment laid down as the result of war experience. The average reduction effected, in the case of capital ships, will be 15·7 per cent.

Reductions on the same scale are not possible in the Mediterranean Fleet, which is already on a reduced complement, and are difficult for more distant Squadrons where a certain percentage of the men is always on the sick list, without possibility of being replaced. Suitable reductions have, however, been arranged wherever conditions admit, and a total decrease of nearly 4,000 Men on Vote A will thus be effected.

All other requirements have been minutely scrutinised, and large reductions arranged for, which are reflected in the total reduction of 20,000 Officers and Men

on Vote A. In order to diminish the numbers absorbed in crossing reliefs the Admiralty have decided to abolish the system of two-year commissions for ships abroad and to keep ships two and a half years on their stations (the time away from the Home Port not to exceed three years).

Vote 1 (*Pay of the Fleet*).

Vote 2 (*Victualling and Clothing*).

Vote 3 (*Medical*).

Vote 4 (*Civilians employed on Fleet Services*).

Reduction on the 4 Votes—£4,781,500.

This Group, consisting of the Votes most closely connected with Fleet numbers, may be conveniently taken together.

The large decrease in the financial provision mainly reflects the great reduction in Naval Personnel to which reference has already been made.

Other contributing factors are the fall in the cost of living, which is responsible not only for lower prices of provisions and (to a lesser extent) of clothing under Vote 2, but also for the consequent reduction of the Men's Marriage Allowance under Vote 1, Messing Allowance and other similar Allowances under Vote 2, and Wages and Bonus under Votes 3 and 4.

In accordance with a decision of H.M. Government, no provision has been made for a Marriage Allowance for Officers.

For the year 1922–23 the apparent cost of the Navy will be swelled by the sum of, approximately, £700,000, which is included in Navy Votes for that portion of the Coast Guard which is occupied upon the non-Naval services of Revenue Protection and Life-saving and will account for 2,480 men out of a total strength of 2,825.

The original purpose of the transfer of the Coast Guard to the Admiralty was the provision of a Naval reserve which could be drawn upon by the Fleet in time of war. Other Naval reserves more adapted to modern requirements have since been developed, and the Coast Guard, which is now a Pensioner Force, is not needed or available as a Reserve. The present position is that most of the Coast Guard Stations are maintained either solely or primarily for Life-saving duties, Revenue Protection, etc. Only about 350 Officers and men are now required for Naval duties, and these are required not merely in peace, but as the nucleus of a larger force which will be needed in war and completed by Reservists.

An Inter-Departmental Committee will shortly consider in detail the Coast Guard numbers and their allocation, and report what is the smallest Coast Guard required for all purposes.

Both under Vote 2 and Vote 3, provision has been made for working stocks to be drawn upon to the utmost extent practicable during 1922–23, so as to reduce expenditure during the year. In accordance with recommendations of the Committee on National Expenditure, one of the two Fleet Hospital Ships has been abolished, and the policy of sharing Shore Hospital accommodation with the other Fighting Services is being adopted, so far as this is possible, without increasing Vote A.

A special Committee has reviewed all the services coming under Vote 4, and substantial economies have been made in them.

Vote 5 (*Education*).

Vote 6 (*Scientific Services*).

Reduction on the two Votes—£122,000.

These two kindred Votes may be conveniently dealt with together.

The Admiralty decided last July upon the appointment of a Committee to recommend reductions in the cost of the R.N. College, Dartmouth. By the adoption of the recommendations of this Committee a saving of £43,000 per annum will be effected.

It has also been decided that, as from the entry of Cadets in May next, the scale of fees payable by parents or guardians shall be increased from £75 to £150 a year. Power will remain with the Admiralty, as at present, to concede a lower scale of fees in the case of those who prove their inability to pay the normal amount, and it is hoped in this way to retain full opportunity for the sons of persons of limited means to pass through Dartmouth into the Navy.

Whilst anxious to effect every economy in administration, the Admiralty feel that a more drastic cutting of the educational and scientific Votes would be inexcusable at a time when we are forced to rely more and more on the hope that the Navy will make up in quality of personnel and superiority of technique for the lead that has been surrendered in respect of *matériel*.

Of all the lessons of the war none stood out more clearly than the importance, and the previous inadequacy, of Science Research, and the Admiralty are convinced that the measures which they have taken are not more than sufficient to maintain research and experiment on a sound and at the same time very moderate and economical basis.

Vote 7 (*Reserves*).

Reduction—£28,300.

In consequence of the Royal Fleet Reservists belonging to Class B having been called out last year, it was decided to excuse them from the annual drill in 1922-23, and, in accordance with the policy of saving expense during that year wherever practicable, the Admiralty have now decided also to omit the annual drill of Class A. A saving of £80,000 will result, which is divided over this Vote and Votes 1, 2, and 11.

Vote 8, *Section I* (*Dockyard Personnel*).

Reduction—£3,849,800.

The Vote provides for a discharge of over 10,000 men from the Royal Dockyards.

This reduction will fall on all Yards at home and abroad. Rosyth will, however, be especially affected, inasmuch as it has been decided after careful consideration to place this establishment upon the footing of a Docking Yard. There are certain ships which cannot be docked in the Southern Yards and must therefore go to Rosyth, and as this necessitates the retention of a nucleus staff there, it is in the interests of economy that certain refitting work should also be undertaken there. Subject to this, however, it has been decided that greater economy can be achieved by a large reduction of Rosyth than by corresponding reductions of Dockyard staff and workmen elsewhere, inasmuch as the saving at Rosyth includes the abolition of "inconvenience money" and expenditure on train services (estimated at £90,000), as well as the saving in salaries and wages. In addition, many new works items previously under consideration will become unnecessary.

The question of the abolition of Chatham Dockyard has also been considered, but under present conditions the small docks and storehouse accommodation at Chatham are required and cannot be dispensed with.

It has been decided not to reduce Pembroke, at present, beyond the point announced last year, viz., to a strength of 1,200 men. The unique and almost complete dependence of the town of Pembroke on the continued existence of the Dockyard makes it clear that, in the present difficult conditions of trade and employment which have so far made it impossible to dispose of this Yard for commercial purposes, the distress and its relief, consequent upon the abolition of this establishment, would, from the point of view of the National Balance-sheet, more than neutralise the direct saving realised.

Gibraltar Dockyard will be considerably reduced, and it is estimated that a saving of £58,000 a year will be effected thereby.

The foregoing large reductions in Dockyard personnel are being made solely to avoid expenditure in the immediate future. They necessitate delaying or abandoning a great deal of important ship construction and reconstruction, as well as the restriction of necessary repairs and refits of the ships of the Fleet. This can only be regarded as a temporary policy to tide over a situaton of extreme financial stringency.

The Admiralty, with the cordial co-operation of the Commissioner of Metropolitan Police, are now engaged on a detailed review of the Police arrangements at the various establishments, and already anticipate, by the release of men consequent on re-adjustment of duties, a saving which will amount to £50,000 per annum when the police rendered superfluous have been withdrawn.

The Admiralty are further proposing, in view of the greatly increased cost of employing Metropolitan Police, to withdraw them altogether from the magazines and Ordnance Depôts and other places where the specialised experience of the Metropolitan Police is not essential, and to substitute a small Force of Marine Pensioner Police, whose numbers, for purposes of discipline, will be provided for in Vote A. The further saving ultimately expected to result from this alteration will be made principally under Vote 9, and may be expected to amount to £50,000 per annum.

Vote 8, *Section II* (*Store Sub-heads*).

Increase—£549,000.

This apparent increase is due to the fact that in 1921-22 Appropriations-in-Aid were estimated at the abnormal figure of £3,550,000 owing to anticipated sales of surplus and obsolete warships. There will, in fact, be a reduction of expenditure to

the extent of, approximately, £1,050,000, due mainly to: (*a*) smaller requirements for Dockyard materials, (*b*) smaller requirements for sea stores for the Fleet, and (*c*) lower prices.

Vote 8, *Section II* (*Fuel Sub-head*).

Reduction—£5,386,500.

In addition to savings due to the fall in prices of Oil Fuel and Coal, a large reduction has been effected by administrative action. The allowance of Fuel for the steaming of the Fleet in 1922-23 has been cut down to the lowest possible limit. Several of the Royal Fleet Auxiliaries normally employed on Fleet fuelling work will be laid up, and the inconvenience resulting from this restriction of fuelling facilities must be accepted as a temporary measure. The existing reserves of coal will also be drawn upon to a larger extent than would ordinarily be prudent.

Further, in view of the improved international situation created by the Washington Conference, the Admiralty have decided, in the existing pressing need for the reduction of expenditure, to reduce by £500,000 the progress in 1922-23 with the scheme for providing Oil Fuel Reserves for the use of the Fleet at various Bases abroad. They do not, however, take this step without considerable anxiety, which will, they believe, be shared by all who realise the extent to which the mobility of the chief units of the British Fleet is restricted under existing conditions, owing to the absence of the necessary Oil Fuelling Bases.

Vote 8, *Section III* (*Contract Shipbuilding*).

Reduction—£2,304,700.

This section provides for the two new Capital Ships agreed to at Washington not being commenced until shortly before the end of 1922-23. The total expenditure under Vote 8, Section III., in 1922-23 in respect of these two ships is estimated at £300,000 as compared with £10,557,800, which would have been the cost of proceeding with the four Battle Cruisers abandoned in consequence of the Washington Conference.

Vote 9 (*Naval Armaments*).

Reduction—£1,837,200.

The expenditure in respect of the two new ships under this Vote is £421,500, as compared with £1,259,000, which would have been incurred if the four Battle Cruisers had been proceeded with.

Large reductions have also been made by deferring the overhaul and reconditioning of surplus stocks of ammunition, by decreasing the reserves of mines and depth charges, and by delaying the completion of the Fleet's equipment of Armour-piercing shell. The Admiralty are satisfied that these reductions are the utmost that can be made without taking unjustifiable risks in connection with the safety of H.M. Ships and the Ordnance Depôts, and without lowering the efficiency of the *matériel* in the Fleet and the training of the personnel to a degree that could not be accepted unless our Fleet is to be considerably inferior to those of the other principal Naval Powers.

Vote 10 (*Works*).

Reduction—£1,573,600.

Of the net total of this Vote (£4,273,000), £1,344,000, or nearly one-third, represents the irreducible annuity under the Naval Works Acts.

The reductions of this Vote have been of the most drastic character. The works included are practically restricted to (*a*) completion of, or progress with, works actually in hand, where stoppage would involve the Admiralty in considerable nugatory expenditure for compensation or the reconditioning of sites, or where the alternative is between wasting large sums already spent in a valuable work or completing it at a comparatively small additional cost; (*b*) cases in which the safety of structures, or the usability of docks, wharves, or important machinery is involved; (*c*) items to which the Admiralty are committed by legal obligation; (*d*) a minimum allowance for ordinary repairs and maintenance; (*e*) Oil Fuel Storage.

New and urgent works of all descriptions outside these categories from small items of £30 upwards in Naval Establishments and Harbours all over the world will cost less than £100,000.

Vote 11 (*Travelling Expenses and Miscellaneous*).

Reduction, £1,091,500.

The greater part of this reduction is due to the progress made in the liquidation of war liabilities.

Another large item, however, is the reduction of £390,000, consequent upon the adoption by H.M. Government of the recommendation of the Committee on National Expenditure that the concession of obtaining a return ticket (under certain restrictions) for a single fare which was granted by the Railway Companies to the officers and men of the Royal Navy and Army before the war shall not now be continued at the cost of Public Funds. The Admiralty trust that the Railway Companies, who gave this concession largely as a matter of business before the war, will find its renewal on the pre-war basis to be not inconsistent with their financial interests. Otherwise there is no doubt that the decision of H.M. Government, however inevitable it may be in present circumstances, will throw a heavy and unexpected burden upon the personnel of the fighting Services.

Vote 12 (*Admiralty Office*).

Reduction, £365,000.

The Headquarters Staff will have been reduced by 31st March next to a substantially lower figure than was mentioned to the Committee on National Expenditure as probable (viz., 4,300). A period, however, during which large reductions are being made in the Navy—involving, as they will, the discharge and pensioning of large numbers of personnel, the retirement of officers under special schemes, the reduction of labour staffs, and the handling of surplus stores—throws an immensely increased amount of work on the Admiralty Staff, and the reduction of staff contemplated in 1922–23, and provided for in this Estimate, undoubtedly exceeds what is really justified by any probable diminution of work that can be expected during that year. The Admiralty have nevertheless determined that this figure shall be worked to, although it is realised that this involves serious risk of losses of public money owing to the staff not being adequate to deal properly with matters involving large sums, as well as delay in the issue of War Medals and Naval Prize.

Non-Effective Votes (*Votes* 13, 14, 15).

Increase, £3,195,800.

The provision made under these Votes makes allowance for abnormal non-effective charges resulting from the reduction of 20,000 officers and men of the Navy and over 10,000 men from the Dockyards during 1922–23. It is inevitable that this reduction, nothing comparable to which has taken place in the Naval history of the last 100 years, must involve special measures which will for the time being increase largely the non-effective Votes.

10th March, 1922. L. of F.

ABSTRACT OF NAVY ESTIMATES FOR 1922–1923.

Votes.		Estimates for 1922–1923. Gross Estimate.	Estimates for 1922–1923. Net Estimate.	Estimates, 1921–1922.* Net Estimate.
	I.—NUMBERS.			
A.	Total number of Officers, Seamen, Boys, and Royal Marines	118,500†	118,500†	148,700‡
	Number of Coastguard and Marine Police	2,900	2,900	
	II.—EFFECTIVE SERVICES.	£	£	£
1	Wages, etc., of Officers, Seamen, and Boys, Coastguard, and Royal Marines	15,910,750	15,856,000	19,059,000
2	Victualling and Clothing for the Navy	7,082,739	5,700,000	8,033,000
3	Medical Establishments and Services	543,917	522,000	720,500
4	Civilians employed on Fleet Services	294,929	292,100	389,000
5	Educational Services	451,645	411,000	465,500
6	Scientific Services	524,365	446,500	449,000
7	Royal Naval Reserves	543,915	543,300	543,600
8	Shipbuilding, Repairs, Maintenance, etc.:			
	Section I.—*Personnel*	8,092,603	7,680,100	11,845,600
	Section II.—*Matériel*	9,558,200	7,263,700	12,083,500
	Section III.—Contract Work	3,357,015	3,334,500	5,646,200
9	Naval Armaments	5,116,793	5,064,500	6,926,000
10	Works, Buildings, and Repairs at Home and Abroad	4,348,000	4,273,000	5,846,600
11	Miscellaneous Effective Services	1,993,699	1,911,900	2,793,000
12	Admiralty Office	1,424,800	1,420,800	1,752,800
	Total Effective Services £	59,243,370	54,719,400	76,553,300
	III.—NON-EFFECTIVE SERVICES.			
13	Naval and Marine, Officers	3,636,028	3,606,600	2,274,268
14	Naval and Marine, Men	5,562,020	5,522,600	3,799,732
15	Civil Superannuation, Compensation Allowances, and Gratuities	1,035,239	1,035,100	816,700
	Total Non-Effective Services £	10,233.287	10,164,300	6,890,700
	GRAND TOTAL £	69,476,657	64,883,700	83,444.000*

* Including Supplementary Estimates, November 2, 1921 (Parliamentary Paper No. 242), and the adjustment in connection with the construction of new capital ships detailed in Parliamentary Paper 187, of July 27, 1921.

† Maximum for the year, viz. on April 1, 1922. Number to be reduced to approximately 98,500 as soon as practicable.

‡ Includes vote of 25,000 men in connection with the industrial emergency (Parliamentary Paper, April 11, 1921 No. 70).

LEE OF FAREHAM.
BEATTY.
H. F. OLIVER.
F. L. FIELD.

ALGERNON D. BOYLE.
ROGER KEYES.
A. E. M. CHATFIELD.
B. EYRES MONSELL.

L. S. AMERY, O. MURRAY — Secretaries.

ADMIRALTY,
April 26, 1922.

STATEMENT SHOWING THE NUMBERS BORNE, THE EXPENDITURE ON NAVAL SERVICES FOR THE YEARS 1913-1914 TO 1920-1921, AND THE ESTIMATES FOR 1921-1922 AND 1922-1923.

Year.	Vote A. — Average numbers borne.	Vote 1. — Wages, &c., of Officers, &c.	Vote 2. — Victualling and Clothing.	Vote 3. — Medical Establishments, &c.	Vote 4. — Martial Law.	Vote 5 — Educational Services.	Vote 6. — Scientific Services.	Vote 7. — Royal Naval Reserves	Vote 8. — Shipbuilding, Repairs, Maintenance, &c. Section I. Personnel.	Vote 8. Section II. Matériel.	Vote 8. Section III. Contract Work.	Vote 9. — Naval Armaments.	Vote 10. — Works.	Vote 11. — Miscellaneous.	Vote 12 — Admiralty Office.	Vote 13. — Half Pay &c.	Vote 14. — Naval, &c., Pensions.	Vote 15. — Civil Superannuation, &c.	Balances Irrecoverable.	Total Expenditure
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
1913–14	142,960	8,262,203	3,034,246	281,382	3,640	156,468	53,375	440,028	4,128,108	6,746,714	13,217,129	4,747,829	3,520,026	734,491	460,221	990,233	1,562,093	392,223	2,212	48,732,621
					Civilians employed on Fleet Services. (a)															
1914–15	199,451	13,637,330	7,411,627	436,589	176,977	161,766	87,090	446,784	5,646,932	22,211,040	30 298,730	9,666,218	3,659,847	5,907,731	583 167	878,045	1,674,160	389,914	27,915	103,301,862
1915–16	297,008	24,321,519	10,796,024	578,703	444,907	171,610	108,535	755,201	7,868,812	44,778,970	64,513,255	25,649,203	5,710,782	16,321,128	851,066	717,519	1,730,117	400,161	17,085	205,733,597
1916–17	349,578	29,399,358	11,173,592	713,525	517,209	201,497	110,478	863,943	8,943,491	40,952,653	53,982,842	36,742,534	6,694,878	15,460,001	1,024,10[illegible]	713,621	1,944,003	388,509	50,976	209,877,218
1917–18	406,977	37,559,536	13,481,159	792,569	561,308	210,243	152,160	874,930	12,660,160	36,494,694	70,609,055	34,177,359	6,556,769	9,193,802	1,454,835	709,227	1,446,247	413,746	41,092	227,388,891
1918–19	381,311	46,373,511	24,219,351	1,158,287	491,270	247,922	262,886	871,970	15,037,763	59,128,675	94,248,874	64,866,784	10,928,241	9,357,532	1,985,894	704,914	3,733,778	445,485	28,090	334,091,227
1919–20	176,087	32,385,306	8,823,106	733,046	556,778	401,864	364,832	458,044	12,426,177	*Credit* :— *785,986*	48,348,933	14,441,835	5,595,608	11,118,631	2,042,715	1,176,937	15,133,064	802,279	60,875	154,084,044
1920–21	124,009	21,314,360	8,311,708	683,830	759,110	503,152	249,185	359,694	12,096,747	6,799,965	12,001.445	8,493,951	4,992,969	5,724,974	2,073,764	2,352,344	4,847,475	880,996	23,611	92,505,290
1921–22* (Estimate)	148,700(b)	19,059,000	8,033,000	720,500	389,000	465,500	449,000	543,600	11,845,600	12,083,500	5,646,200	6,926,000	5,846,600	2,793,000	1,752,800	2,070,500 ([illegible])	4 003,500 (d)	816,700	—	83,444,000
1922–23 (Estimate)	121,400(c)	15,856,000	5,700,000	522,000	292,100	411,000	446,500	543,300	7,680,100	7,263,700	3,334,500	5,064,500	4,273,000	1,911,900	1,420,800	3,606,600	5,522,600	1,035,100	–	64,883,700

Note.—The figures under Vote 9 include the cost of Naval Aviation Services from the year 1916-1917 to the year 1919-1920 inclusive.

* Including Supplementary Estimate, Nov. 2, 1921 (Parliamentary Paper 242), and the adjustment in connection with the construction of new capital ships detailed in Parliamentary Paper 187, of July 27, 1921.

(*a*) Replacing "Martial Law," transferred to Vote 11 in 1914-1915.

(*b*) Maximum number voted, including the additional numbers (25,000) in connection with the industrial emergency (Parliamentary Paper 70, of April 11, 1921); the estimated average for the year is 127,184.

(*c*) Maximum for the year, viz. on April 1, 1922, including Coastguard and Marine Police.

(*d*) These figures represent the sums actually voted in 1921–22. The figures for these votes for 1921–22, shown in the general abstract on pages 4 and 5, and on pages 184 and 201 of the Navy Estimates, 1922–23, represent the figures on the basis of the votes as rearranged in the Estimates for 1922–23.

EXPENDITURE FOR NAVAL PURPOSES OF THE PRINCIPAL FOREIGN POWERS.

UNITED STATES NAVY.

Appropriation Act, 1923 (July 1, 1922, to June 30, 1923).

(Total appropriations for 1922 : 410,830,935 dollars.)

The Naval Appropriation Act, 1923, was passed by Congress in June, 1922. The total sum appropriated for naval purposes is approximately 342,000,000 dollars, of which approximately 289,500,000 dollars is a direct appropriation, the remainder representing unexpended balances and other credits. The expenditure allocated under the prinicipal headings is as under :—

	Dollars.
Pay	127,922,565
Provisions and Clothing	23,610,874
Education	3,130,411
Naval Reserves	8,689,233
Maintenance and Repairs	51,349,260
New Construction	59,885,000
Fuel	16,000,000
Dockyards and Works	10,717,500
*Aviation	14,683,950
Miscellaneous (including Navy Department)	25,832,567
Total	341,819,360 †

* The United States Navy having its own Air Service the pay of personnel, etc. is included under heading of Pay.

† The par rate of exchange is $4·866 to the £.

IMPERIAL JAPANESE NAVY.

Estimates, 1922–23.

The Estimates of the Imperial Japanese Navy, which in the previous year were 502,063.901 yen, for the financial year 1922–23 are divided under two headings, ordinary and extraordinary; the main details of which are as follows :—

Ordinary.	Yen.
Admiralty	556,368
Pay and Allowances	41,371,656
Provisions and Clothing	17,924,789
Maintenance	24,297,153
Manœuvres	330,500
Shipbuilding, Armament, and Repairs	40,784,252
Education	949,920
Secret Service	80,000
Miscellaneous	8,875,662
Total	135,170,300
Extraordinary.	
Armament and Munition Replenishment	233,801,917
Extraordinary Replenishment of Arms	1,304,000
Repairs and Extraordinary Construction	4,517,540
Dockyards and Works	10,852,064
Naval Dockyard Fund	1,700,000
Grand Naval Manœuvres	5,078,214
Aviation	349,530*
Miscellaneous	889,084
Total	258,492,349 †

Grand Total = Yen 393,662,649.

* This figure is not believed to represent the full expenditure on aviation, which is understood to be approximately five and a half million yen. The Japanese Navy maintains its own Air Service.

† The par rate of exchange is 9·75 yen to the £.

FRENCH NAVY.

Authorised Expenditure, 1922–23.

The sums voted under the principal headings for the French Navy during the financial year 1922–23 are given below and compared with an expenditure for 1921–22 of 951,542,607 francs. The total does not, however, include any portion of the cost of the special building programme, amounting to an expenditure of 755,000,000 francs, spread over a period of four years.

	Francs.
Admiralty, including Research and Hydrographic Service	18,822,291
Pay	183,591,516
Victualling, Clothing, Stores, etc.	245,402,143
Maintenance and Repairs	135,645,764
Ordnance	47,078,016
Construction (Ships and Armaments)	73,019,620
*Aviation	49,180,093
Miscellaneous	187,208,673
Total	939,948,116 †

* The French Navy maintains its own Air Service.
† The par rate of exchange is 25·225 frs. to the £.

ROYAL ITALIAN NAVY.

Estimates, 1922–23.

For the year July 1, 1922, to June 30, 1923, a sum of 611,102,100 lire has been voted for the Italian Navy; the summarised expenditure being as follows:–

	Lire.
General	103,309,800
Pensions	20,090,000
War Expenses	11,000,000
Education	2,824,000
Lighthouses and Pilotage	3,151,000
*Aviation	7,700,000
New Construction	64,000,000
Maintenance, Shore Establishments, Armaments, Coast Defence, etc.	399,027,300
Total	611,102,100 †

This total is 233,705,000 lire less than the expenditure for 1921–22, in the estimates for which, however, a sum of 300,000,000 lire was set apart for paying off war expenses.

* The Royal Italian Navy has its own Air Service. The sum set apart for aviation does not include pay of personnel, etc.

† The par rate of exchange is 25·225 lire to the £.

WASHINGTON TREATY FOR THE LIMITATION OF NAVAL ARMAMENT.

THE United States of America, the British Empire, France, Italy and Japan:

Desiring to contribute to the maintenance of the general peace, and to reduce the burdens of competition in armament;

Have resolved, with a view to accomplishing these purposes, to conclude a treaty to limit their respective naval armament, and to that end have appointed as their Plenipotentiaries:

The President of the United States of America:
Charles Evans Hughes,
Henry Cabot Lodge,
Oscar W. Underwood,
Elihu Root,
Citizens of the United States;

His Majesty the King of the United Kingdom of Great Britain, and Ireland and of the British Dominions beyond the Seas, Emperor of India:

The Right Honourable Arthur James Balfour, O.M., M.P., Lord President of His Privy Council;

The Right Honourable Baron Lee of Fareham, G.B.E., K.C.B., First Lord of His Admiralty;

The Right Honourable Sir Auckland Campbell Geddes, K.C.B., His Ambassador Extraordinary and Plenipotentiary to the United States of America;

and

for the Dominion of Canada:

The Right Honourable Sir Robert Laird Borden, G.C.M.G., K.C.;

for the Commonwealth of Australia:

Senator the Right Honourable George Foster Pearce, Minister for Home and Territories;

for the Dominion of New Zealand:

The Honourable Sir John William Salmond, K.C., Judge of the Supreme Court of New Zealand;

for the Union of South Africa:

The Right Honourable Arthur James Balfour, O.M., M.P.;

for India:

The Right Honourable Valingman Sankaranarayana Srinivasa Sastri, Member of the Indian Council of State;

The President of the French Republic:
Mr. Albert Sarraut, Deputy, Minister of the Colonies;
Mr. Jules J. Jusserand, Ambassador Extraordinary and Plenipotentiary to the United States of America, Grand Cross of the National Order of the Legion of Honour:

His Majesty the King of Italy:
The Honourable Carlo Schanzer, Senator of the Kingdom;
The Honourable Vittoro Rolandi Ricci, Senator of the Kingdom, His Ambassador Extraordinary and Plenipotentiary at Washington;
The Honourable Luigi Albertini, Senator of the Kingdom;

His Majesty the Emperor of Japan:
Baron Tomosaburo Kato, Minister for the Navy, Junii, a member of the First Class of the Imperial Order of the Grand Cordon of the Rising Sun with the Paulownia Flower;
Baron Kijuro Shidehara, His Ambassador Extraordinary and Plenipotentiary at Washington, Joshii, a member of the First Class of the Imperial Order of the Rising Sun;
Mr. Masanao Hanihara, Vice-Minister for Foreign Affairs, Jushii, a member of the Second Class of the Imperial Order of the Rising Sun;

Who, having communicated to each other their respective full powers, found to be in good and due form, have agreed as follows:—

CHAPTER I.

General Provisions Relating to the Limitation of Naval Armament.

Article I.

The Contracting Powers agree to limit their respective naval armament as provided in the present Treaty.

Article II.

The Contracting Powers may retain respectively the capital ships which are specified in Chapter II., Part 1. On the coming into force of the present Treaty, but subject to the following provisions of this Article, all other capital ships, built or building, of the United States, the British Empire and Japan shall be disposed of as prescribed in Chapter II., Part 2.

In addition to the capital ships specified in Chapter II., Part 1, the United States may complete and retain two ships of the "West Virginia" class now under construction. On the completion of these two ships the North Dakota and Delaware shall be disposed of as prescribed in Chapter II., Part 2.

The British Empire may, in accordance with the replacement table in Chapter II., Part 3, construct two new capital ships not exceeding 35,000 tons (36,560 metric tons) standard displacement

each. On the completion of the said two ships the Thunderer, King George V., Ajax and Centurion shall be disposed of as prescribed in Chapter II., Part 2.

Article III.

Subject to the provisions of Article II., the Contracting Powers shall abandon their respective capital ship-building programmes, and no new capital ships shall be constructed or acquired by any of the Contracting Powers except replacement tonnage which may be constructed or acquired as specified in Chapter II., Part 3.

Ships which are replaced in accordance with Chapter II., Part 3, shall be disposed of as prescribed in Part 2 of that Chapter.

Article IV.

The total capital ship replacement tonnage of each of the Contracting Powers shall not exceed in standard displacement, for the United States, 525,000 tons (533,400 metric tons); for the British Empire, 525,000 tons (533,400 metric tons); for France, 175,000 tons (177,800 metric tons); for Italy, 175,000 tons (177,800 metric tons); for Japan 315,000 tons (320,040 metric tons).

Article V.

No capital ship exceeding 35,000 tons (35,560 metric tons) standard displacement shall be acquired by, or constructed by, for, or within the jurisdiction of, any of the Contracting Powers.

Article VI.

No capital ship of any of the Contracting Powers shall carry a gun with a calibre in excess of 16 inches (406 millimetres).

Article VII.

The total tonnage for aircraft carriers of each of the Contracting Powers shall not exceed in standard displacement, for the United States, 135,000 tons (137,160 metric tons); for the British Empire, 135,000 tons (137,160 metric tons); for France, 60,000 tons (60,960 metric tons); for Italy, 60,000 tons (60,960 metric tons); for Japan, 81,000 tons (82,296 metric tons).

Article VIII.

The replacement of aircraft carriers shall be effected only as prescribed in Chapter II., Part 3, provided, however, that all aircraft carrier tonnage in existence or building on November 12, 1921, shall be considered experimental, and may be replaced, within the total tonnage limit prescribed in Article VII., without regard to its age.

Article IX.

No aircraft carrier exceeding 27,000 tons (27,433 metric tons) standard displacement shall be acquired by, or constructed by, for or within the jurisdiction of, any of the Contracting Powers.

However, any of the Contracting Powers may, provided that its total tonnage allowance of aircraft carriers is not thereby exceeded,

build not more than two aircraft carriers, each of a tonnage of not more than 33,000 tons (33,528 metric tons) standard displacement, and in order to effect economy any of the Contracting Powers may use for this purpose any two of their ships, whether constructed or in course of construction, which would otherwise be scrapped under the provisions of Article II. The armament of any aircraft carriers exceeding 27,000 tons (27,432 metric tons) standard displacement shall be in accordance with the requirements of Article X., except that the total number of guns to be carried in case any of such guns be of a calibre exceeding 6 inches (152 millimetres), except anti-aircraft guns and guns not exceeding 5 inches (127 millimetres), shall not exceed eight.

Article X.

No aircraft carrier of any of the Contracting Powers shall carry a gun with a calibre in excess of 8 inches (203 millimetres). Without prejudice to the provisions of Article IX., if the armament carried includes guns exceeding 6 inches (152 millimetres) in calibre the total number of guns carried, except anti-aircraft guns and guns not exceeding 5 inches (127 millimetres), shall not exceed ten. If alternatively the armament contains no guns exceeding 6 inches (152 millimetres) in calibre, the number of guns is not limited. In either case the number of anti-aircraft guns and of guns not exceeding 6 inches (127 millimetres) is not limited.

Article XI.

No vessel of war exceeding 10,000 tons (10,160 metre tons) standard displacement, other than a capital ship or aircraft carrier, shall be acquired by, or constructed by, for, or within the jurisdiction of, any of the Contracting Powers. Vessels not specifically built as fighting ships not taken in time of peace under Government control for fighting purposes, which are employed on fleet duties or as troop transports or in some other way for the purpose of assisting in the prosecution of hostilities otherwise than as fighting ships, shall not be within the limitations of this Article.

Article XII.

No vessel of war of any of the Contracting Powers, hereafter laid down, other than a capital ship, shall carry a gun with a calibre in excess of 8 inches (203 millimetres).

Article XIII.

Except as provided in Article IX., no ship designated in the present Treaty to be scrapped may be reconverted into a vessel of war.

Article XIV.

No preparations shall be made in merchant ships in time of peace for the installation of warlike armaments for the purpose of converting such ships into vessels of war, other than the necessary stiffening of decks for the mounting of guns not exceeding 6-inch (153 millimetres) calibre.

Article XV.

No vessel of war constructed within the jurisdiction of any of the Contracting Powers for a non-Contracting Power shall exceed the limitations as to displacement and armament prescribed by the present Treaty for vessels of a similar type which may be constructed by or for any of the Contracting Powers; provided, however, that the displacement for aircraft carriers constructed for a non-Contracting Power shall in no case exceed 27,000 tons (27,432 metric tons) standard displacement.

Article XVI.

If the construction of any vessel of war for a non-Contracting Power is undertaken within the jurisdiction of any of the Contracting Powers, such Power shall promptly inform the other Contracting Powers of the date of the signing of the contract and the date on which the keel of the ship is laid; and shall also communicate to them the particulars relating to the ship prescribed in Chapter II., Part 3, Section I. (*b*), (4) and (5).

Article XVII.

In the event of a Contracting Power being engaged in war, such Power shall not use as a vessel of war any vessel of war which may be under construction within its jurisdiction for any other Power, or which may have been constructed within its jurisdiction for another Power and not delivered.

Article XVIII.

Each of the Contracting Powers undertakes not to dispose by gift, sale or any mode of transfer of any vessel of war in such a manner that such vessel may become a vessel of war in the Navy of any foreign Power.

Article XIX.

The United States, the British Empire and Japan agree that the *status quo* at the time of the signing of the present Treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder:—

1. The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (*a*) those adjacent to the coast of the United States, Alaska and the Panama Canal Zone, not including the Aleutian Islands, and (*b*) the Hawaiian Islands;

2. Hong Kong and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of the meridian of 110° east longitude, except (*a*) those adjacent to the coast of Canada, (*b*) the Commonwealth of Australia and its territories, and (*c*) New Zealand;

3. The following insular territories and possessions of Japan in the Pacific Ocean, to wit: the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa and the Pescadores,

and any insular territories or possessions in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defences of the territories and possessions above specified. This restriction, however, does not preclude such repair and replacement of worn-out weapons and equipment as is customary in naval and military establishments in time of peace.

Article XX.

The rules for determining tonnage displacement prescribed in Chapter II., Part 4, shall apply to the ships of each of the Contracting Powers.

CHAPTER II.

Rules Relating to the Execution of the Treaty—Definition of Terms.

Part I.—Capital Ships which may be Retained by the Contracting Powers.

In accordance with Article II. ships may be retained by each of Contracting Powers as specified in this Part.

Ships which may be retained by the United States.

Name.	Tonnage.
Maryland	32,600
California	32,300
Tennessee	32,300
Idaho	32,000
New Mexico	32,000
Mississippi	32,000
Arizona	31,400
Pennsylvania	31,400
Oklahoma	27,500
Nevada	27,500
New York	27,000
Texas	27,000
Arkansas	26,000
Wyoming	26,000
Florida	21,825
Utah	21,825
North Dakota	20,000
Delaware	20,000
Total tonnage	500,650

On the completion of the two ships of the "West Virginia" class and the scrapping of the "North Dakota" and "Delaware," as provided in Article II, the total tonnage to be retained by the United States will be 525,850 tons.

Ships which may be retained by the British Empire.

Name.	Tonnage.
Royal Sovereign	25,750
Royal Oak	25,750
Revenge	25,750
Resolution	25,750
Ramillies	25,750
Malaya	27,500
Valiant	27,500
Barham	27,500
Queen Elizabeth	27,500
Warspite	275,00
Benbow	25,000
Emperor of India	25,000
Iron Duke	25,000
Marlborough	25,000
Hood	41,200
Renown	26,500
Repulse	26,500
Tiger	28,500
Thunderer	22,500
King George V	23,000
Ajax	23,000
Centurion	23,000
Total tonnage	580,450

On the completion of the two new ships to be constructed and the scrapping of the Thunderer, King George V., Ajax and Centurion, as provided in Article II., the total tonnage to be retained by the British Empire will be 558,950 tons.

Ships which may be retained by France.

Name.	Tonnage (metric tons).
Bretagne	23,500
Lorraine	23,500
Provence	23,500
Paris	23,500
France	23,500
Jean Bart	23,500
Courbet	23,500
Condorcet	18,890
Diderot	18,890
Voltaire	18,890
Total tonnage	221,170

France may lay down new tonnage in the years, 1927, 1929 and 1931, as provided in Part 3, Section II.

Ships which may be retained by Italy.

Name.	Tonnage (metric tons).
Andrea Doria	22,700
Caio Duilio	22,700
Conte di Cavour	22,500
Giulio Cesare	22,500
Leonardo da Vinci	22,500
Dante Alighieri	19,500
Roma	12,600
Napoli	12,600
Vittorio Emanuele	12,600
Regina Elena	12,600
Total tonnage	182,800

Italy may lay down new tonnage in the years 1927, 1929 and 1931, as provided in Part 3, Section II.

Ships which may be retained by Japan.

Name.	Tonnage.
Mutsu	33,800
Nagato	33,800
Hiuga	31,260
Ise	31,260
Yamashiro	30,600
Fu-So	30,600
Kirishima	27,500
Haruna	27,500
Hiyei	27,500
Kongo	27,500
Total tonnage	301,320

Part 2.—Rules for Scrapping Vessels of War.

The following rules shall be observed for the scrapping of vessels of war which are to be disposed of in accordance with Articles II. and III.

I. A vessel to be scrapped must be placed in such condition that it cannot be put to combative use.

II. This result must be finally effected in any one of the following ways:

(*a.*) Permanent sinking of the vessel;

(*b.*) Breaking the vessel up. This shall always involve the destruction or removal of all machinery, boilers and armour, and all deck, side and bottom plating;

(*c.*) Converting the vessel to target use exclusively. In such case all the provisions of paragraph III. of this Part, except sub-paragraph (6), in so far as may be necessary to enable the ship to be used as a mobile target, and except sub-paragraph (7), must be previously complied with. Not more than one capital ship may be retained for this purpose at one time by any of the Contracting Powers.

(*d.*) Of the capital ships which would otherwise be scrapped under the present Treaty in or after the year 1931, France and Italy may each retain two sea-going vessels for training purposes exclusively, that is, as gunnery or torpedo schools. The two vessels retained by France shall be of the "Jean Bart" class, and of those retained by Italy one shall be the Dante Alighieri, the other of the "Giulio Cesare" class. On retaining these ships for the purpose above stated, France and Italy respectively undertake to remove and destroy their conning-towers, and not to use the said ships as vessels of war.

III.—(*a.*) Subject to the special exceptions contained in Article IX., when a vessel is due for scrapping, the first stage of scrapping, which consists in rendering a ship incapable of further warlike service, shall be immediately undertaken.

(*b.*) A vessel shall be considered incapable of further warlike service when there shall have been removed and landed, or else destroyed in the ship:

1. All guns and essential portions of guns, fire-control tops and revolving parts of all barbettes and turrets ;
2. All machinery for working hydraulic or electric mountings ;
3. All fire-control instruments and range-finders ;
4. All ammunition, explosives and mines ;
5. All torpedoes, war-heads and torpedo tubes ;
6. All wireless telegraphy installations ;
7. The conning tower and all side armour, or alternatively all main propelling machinery ; and
8. All landing and flying-off platforms and all other aviation accessories.

IV. The periods in which scrapping of vessels is to be effected are as follows :

(*a.*) In the case of vessels to be scrapped under the first paragraph of Article II., the work of rendering the vessels incapable of further warlike service, in accordance with paragraph III. of this Part shall be completed within six months from the coming into force of the present Treaty, and the scrapping shall be finally effected within eighteen months from such coming into force.

(*b.*) In the case of vessels to be scrapped under the second and third paragraphs of Article II., or under Article III., the work of rendering the vessel incapable of further warlike service in accordance with paragraph III. of this Part shall be commenced not later than the date of completion of its successor, and shall be finished within six months from the date of such completion. The vessel shall be finally scrapped, in accordance with paragraph II. of this Part, within eighteen months from the date of completion of its successor. If, however, the completion of the new vessel be delayed, then the work of rendering the old vessel incapable of further warlike service in accordance with paragraph III. of this Part shall be commenced within four years from the laying of the keel of the new vessel, and shall be finished within six months from the date on which such work was commenced, and the old vessel shall be finally scrapped in accordance with paragraph II. of this Part within eighteen months from the date when the work of rendering it incapable of further warlike service was commenced.

PART 3.—REPLACEMENT.

The replacement of capital ships and aircraft carriers shall take place according to the rules in Section I. and the tables in Section II. of this Part.

Section I.—*Rules for Replacement.*

(*a.*) Capital ships and aircraft carriers twenty years after the date of their completion may, except as otherwise provided in

Article VIII. and in the tables in Section II. of this Part, be replaced by new construction, but within the limits prescribed in Article IV. and Article VII. The keels of such new construction may, except as otherwise provided in Article VIII. and in the tables in Section II. of this Part, be laid down not earlier than seventeen years from the date of completion of the tonnage to be replaced, provided, however, that no capital ship tonnage, with the exception of the ships referred to in the third paragraph of Article II., and the replacement tonnage specifically mentioned in Section II. of this Part, shall be laid down until ten years from November 12, 1921.

(*b.*) Each of the Contracting Powers shall communicate promptly to each of the other Contracting Powers the following information:

1. The names of the capital ships and aircraft carriers to be replaced by new construction;
2. The date of governmental authorisation of replacement tonnage;
3. The date of laying the keels of replacement tonnage;
4. The standard displacement in tons and metric tons of each new ship to be laid down, and the principal dimensions namely, length at waterline, extreme beam at or below waterline, mean draft at standard displacement;
5. The date of completion of each new ship and its standard displacement in tons and metric tons, and the principal dimensions, namely, length at waterline, extreme beam at or below waterline, mean draft at standard displacement at time of completion.

(*c.*) In case of loss or accidental destruction of capital ships or aircraft carriers, they may immediately be replaced by new construction subject to the tonnage limits prescribed in Articles IV. and VII. and in conformity with the other provisions of the present Treaty, the regular replacement programme being deemed to be advanced to that extent.

(*d.*) No retained capital ships or aircraft carriers shall be reconstructed except for the purpose of providing means of defence against air and submarine attack, and subject to the following rules: The Contracting Powers may, for that purpose, equip existing tonnage with bulge or blister or anti-air attack deck protection, providing the increase of displacement thus effected does not exceed 3,000 tons (3,048 metric tons) displacement for each ship. No alterations in side armour, in calibre, number or general type of mounting of main armament shall be permitted except:

1. In the case of France and Italy, which countries within the limits allowed for bulge may increase their armour protection and the calibre of the guns now carried in their existing capital ships so as not to exceed 16 inches (406 millimetres), and
2. The British Empire shall be permitted to complete, in the case of the Renown, the alterations to armour that have already been commenced but temporarily suspended.

Section II.—*Replacement and Scrapping of Capital Ships.*

United States.

Year.	Ships laid down.	Ships completed.	Ships scrapped (age in parentheses).	Ships retained. Summary.	
				Pre-Jutland.	Post Jutland.
			Maine (20), Missouri (20), Virginia (17), Nebraska (17), Georgia (17), New Jersey (17), Rhode Island (17), Connecticut (17), Louisiana (17), Vermont (16), Kansas (16), Minnesota (16), New Hampshire (15), South Carolina (13), Michigan (13), Washington (0), South Dakota (0), Indiana (0), Montana (0), North Carolina (0), Iowa (0), Massachussetts (0), Lexington (0), Constitution (0), Constellation (0), Saratoga (0), Ranger (0), United States (0) *	17	1
1922	...	A, B†	Delaware (12), North Dakota (12)	15	3
1923	...	...	... ...	15	3
1924	...	...	... ...	15	3
1925	...	...	... ...	15	3
1926	...	...	... ...	15	3
1927	...	...	... ...	15	3
1928	...	...	... ...	15	3
1929	...	...	... ...	15	3
1930	...	...	... ...	15	3
1931	C, D	...	... ...	15	3
1932	E, F	...	... ...	15	3
1933	G	...	... ...	15	3
1934	H, I	C, D	Florida (23), Utah (23), Wyoming (22)	12	5
1935	J	E, F	Arkansas (23), Texas (21), New York (21)	9	7
1936	K, L	G	Nevada (20), Oklahoma (20) ...	7	8
1937	M	H, I	Arizona (21), Pennsylvania (21) ...	5	10
1938	N, O	J	Mississippi (21)	4	11
1939	P, Q	K, L	New Mexico (21), Idaho (20) ...	2	13
1940	...	M	Tennessee (20)	1	14
1941	...	N, O	California (20), Maryland (20) ...	0	15
1942	...	P, Q	2 ships "West Virginia" class ...	0	15

* The United States may retain the Oregon and Illinois, for non-combatant purposes, after complying with the provisions of Part 2, III (*b*).

† Two "West Virginia" class.

Note.—A, B, C, D, etc., represent individual capital ships of 35,000 tons standard displacement, laid down and completed in the years specified.

BRITISH EMPIRE.

Year.	Ships laid down.	Ships completed.	Ships scrapped (age in parentheses).	Ships retained. Summary. Pre-Jutland.	Post-Jutland.
			Commonwealth (16), Agamemnon (13), Dreadnought (15), Bellerophon (12), St. Vincent (11), Inflexible (13), Superb (12), Neptune (10), Hercules (10), Indomitable (13), Temeraire (12), New Zealand (9), Lion (9), Princess Royal (9), Conqueror (9), Monarch (9), Orion (9), Australia (8), Agincourt (7), Erin (7), 4 building or projected	21	1
1922	A, B†	...	... ...	21	1
1923	...	...	... ...	21	1
1924	...	...	... ...	21	1
1925	...	A, B	King George V (13), Ajax (12), Centurion (12), Thunderer (13)	17	3
1926	...	...	... ...	17	3
1927	...	...	... ...	17	3
1928	...	...	... ...	17	3
1929	...	...	... ...	17	3
1930	...	...	... ...	17	3
1931	C, D	...	... ...	17	3
1932	E, F	...	... ...	17	3
1933	G	...	... ...	17	3
1934	H, I	C, D	Iron Duke (20), Marlborough (20), Emperor of India (20), Benbow (20)	13	5
1935	J	E, F	Tiger (21), Queen Elizabeth (20), Warspite (20), Barham (20)	9	7
1936	K, L	G	Malaya (20), Royal Sovereign (20)	7	8
1937	M	H, I	Revenge (21), Resolution (21) ...	5	10
1938	N, O	J	Royal Oak (22)	4	11
1939	P, Q	K, L	Valiant (23, Repulse (23)	2	13
1940	...	M	Renown (24)	1	14
1941	...	N, O	Ramillies (24), Hood (21) ...	0	15
1942	...	P, Q	A (17), B (17)	0	15

* The British Empire may retain the Colossus and Collingwood for non-combatant purposes after complying with the provisions of Part 2, III (*b*).

† Two 35,000-ton ships, standard displacement.

NOTE.—A, B, C, D, etc., represent individual capital ships of 35,000 tons standard displacement laid down and completed in the years specified.

France.

Year.	Ships laid down.	Ships completed.	Ships scrapped (age in parentheses).	Ships retained. Summary. Pre-Jutland.	Post-Jutland.
	Tons.	Tons.			
1922	...	...	... ...	7	0
1923	..	...	.. ..	7	0
1924	...	...	... ...	7	0
1925	...	...	... ...	7	0
1926	...	...	... ...	7	0
1927	35,000	...	... ...	7	0
1928	...	...	... ...	7	0
1929	35,000	...	... ...	7	0
1930	...	35,000	Jean Bart (17), Courbet (17) ...	5	*
1931	35,000	...	... ...	5	*
1932	35,000	35,000	France (18)	4	*
1933	35,000	...	... ...	4	*
1934	...	35,000	Paris (20), Bretagne (20)	2	*
1935	...	35,000	Provence (20)	1	*
1936	...	35,000	Lorraine (20)	0	*
1937	...	...	... ...	0	*
1938	...	...	... ...	0	*
1939	..	...	... ...	0	*
1940	...	...	... ...	0	*
1941	...	...	... ...	0	*
1942	...	...	... ..	0	*

Note.—France expressly reserves the right of employing the capital ship tonnage allotment as she may consider advisable, subject solely to the limitations that the displacement of individual ships should not surpass 35,000 tons, and that the total capital ship tonnage should keep within the limits imposed by the present Treaty.

Italy.

Year.	Ships laid down.	Ships completed.	Ships scrapped (age in parentheses).	Ships retained. Summary. Pre-Jutland.	Post-Jutland.
	Tons.	Tons.			
1922	...	...	... ...	6	0
1923	...	...	... ...	6	0
1924	...	...	... ...	6	0
1925	...	...	... ...	6	0
1926	...	...	... ...	6	0
1927	35,000	...	... ...	6	0
1928	...	...	... ...	6	0
1929	35,000	...	... ...	6	0
1930	...	...	... ...	6	0
1931	35,000	35,000	Dante Alighieri (19)	5	*
1932	45,000	...	... ..	5	*
1933	25,000	35,000	Leonardi da Vinci (19)	4	*
1934	...	...	... ...	4	*
1935	...	35,000	Giulio Cesare (21)	3	*
1936	...	45,000	Conte di Cavour (21), Duilio (21)	1	*
1937	...	25,000	Andrea Doria	0	*

Note.—Italy expressly reserves the right of employing the capital ship tonnage allotment as she may consider advisable, subject solely to the limitations that the displacement of individual ships should not surpass 35,000 tons, and the total capital ship tonnage should keep within the limits imposed by the present Treaty.

* Within tonnage limitations; number not fixed.

Japan.

Year.	Ships laid down.	Ships completed.	Ships scrapped (age in parentheses).	Ships retained. Summary.	
				Pre-Jutland.	Post-Jutland
		...	Hizen (20), Mikasa (20), Kashima (16), Katori (16), Satsuma (12), Aki (11), Settsu (10), Ikoma (11), Ibuki (12), Kurama (11), Amagi (0), Akagi (0), Kaga (0), Tosa (0), Takao (0), Atago (0). Projected programme 8 ships not laid down.*	8	2
1922	...	...	... ...	8	2
1923	...	...	... ...	8	2
1924	...	...	... ...	8	2
1925	..	...	... ...	8	2
1926	...	...	... ...	8	2
1927	...	...	... ...	8	2
1928	...	...	... ...	8	2
1929	...	...	... ..	8	2
1930	...	...	... ...	8	2
1931	A	...	... ...	8	2
1932	B	...	... ...	8	2
1933	C	...	... ...	8	2
1934	D	A	Kongo (21)	7	3
1935	E	B	Hiyei (21), Haruna (20)	5	4
1936	F	C	Kirishima (21)	4	5
1937	G	D	Fuso (22)	3	6
1938	H	E	Yamashiro (21)	2	7
1939	I	F	Ise (22)	1	8
1940	...	G	Hiuga (22)	0	9
1941	...	H	Nagato (21)...	0	9
1942	...	I	Mutsu (21)	0	9

* Japan may retain the Shikishima and Asahi for non-combatant purposes, after complying with the provisions of Part 2, III (*b*).

Note.—A, B, C, D, &c., represent individual capital ships of 35,000 tons standard displacement, laid down and completed in the years specified.

Note Applicable to all the Tables in Section II.

The order above precribed in which ships are to be scrapped is in accordance with their age. It is understood that when replacement begins according to the above tables, the order of scrapping in the case of the ships of each of the Contracting Powers may be varied at its option; provided, however, that such Power shall scrap in each year the number of ships above stated.

Part 4.—Definitions.

For the purposes of the present Treaty, the following expressions are to be understood in the sense defined in this Part.

Capital Ship.

A capital ship, in the case of ships hereafter built, is defined as a vessel of war, not an aircraft carrier, whose displacement exceeds

10,000 tons (10,160 metric tons) standard displacement, or which carries a gun with a calibre exceeding 8 inches (203 millimetres).

Aircraft Carrier.

An aircraft carrier is defined as a vessel of war with a displacement in excess of 10,000 tons (10,160 metric tons) standard displacement designed for the specific and exclusive purpose of carrying aircraft. It must be so constructed that aircraft can be launched therefrom and landed thereon, and not designed and constructed for carrying a more powerful armament than that allowed to it under Article IX. or Article X. as the case may be.

Standard Displacement.

The standard displacement of a ship is the displacement of the ship complete, fully manned, engined, and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores and implements of every description that are intended to be carried in war, but without fuel or reserve feed water on board.

The word "ton" in the present Treaty, except in the expression "metric tons," shall be understood to mean the ton of 2,240 pounds (1,016 kilog.).

Vessels now completed shall retain their present ratings of displacement tonnage in accordance with their national system of measurement. However, a Power expressing displacement in metric tons shall be considered for the application of the present Treaty as owning only the equivalent displacement in tons of 2,240 pounds.

A vessel completed hereafter shall be rated at its displacement tonnage when in the standard condition defined herein.

CHAPTER III.

Miscellaneous Provisions.

Article XXI.

If during the term of the present Treaty the requirements of the national security of any Contracting Power in respect of naval defence are, in the opinion of that Power, materially affected by any change of circumstances, the Contracting Powers will, at the request of such Power, meet in conference with a view to the consideration of the provisions of the Treaty and its amendment by mutual agreement.

In view of possible technical and scientific developments, the United States, after consultation with the other Contracting Powers, shall arrange for a conference of all the Contracting Powers which shall convene as soon as possible after the expiration of eight years

from the coming into force of the present Treaty to consider what changes, if any, in the Treaty may be necessary to meet such developments.

Article XXII.

Whenever any Contracting Power shall become engaged in a war which in its opinion affects the naval defence of its national security, such Power may after notice to the other Contracting Powers suspend for the period of hostilities its obligations under the present Treaty other than those under Articles XIII. and XVII., provided that such Power shall notify the other Contracting Powers that the emergency is of such a character as to require such suspension.

The remaining Contracting Powers shall in such case consult together with a view to agreement as to what temporary modifications, if any, should be made in the Treaty as between themselves. Should such consultation not produce agreement, duly made in accordance with the constitutional methods of the respective Powers, any one of the said Contracting Powers may, by giving notice to the other Contracting Powers, suspend for the period of hostilities its obligations under the present Treaty, other than under those Articles XIII. and XVI.

On the cessation of hostilities the Contracting Powers will meet in conference to consider what modifications, if any, should be made in the provisions of the present Treaty.

Article XXIII.

The present Treaty shall remain in force until December 31, 1936, and in case none of the Contracting Powers shall have given notice two years before that date of its intention to terminate the Treaty, it shall continue in force until the expiration of two years from the date on which notice of termination shall be given by one of the Contracting Powers, whereupon the Treaty shall terminate as regards all the Contracting Powers. Such notice shall be communicated in writing to the Government of the United States, which shall immediately transmit a certified copy of the notification to the other Powers and inform them of the date on which it was received. The notice shall be deemed to have been given and shall take effect on that date. In the event of notice of termination being given by the Government of the United States, such notice shall be given to the diplomatic representatives at Washington of the other Contracting Powers, and the notice shall be deemed to have been given and shall take effect on the date of the communication made to the said diplomatic representatives.

Within one year of the date on which a notice of termination by any Power has taken effect, all the Contracting Powers shall meet in conference.

Article XXIV.

The present Treaty shall be ratified by the Contracting Powers in accordance with their respective constitutional methods and shall

take effect on the date of the deposit of all the ratifications, which shall take place at Washington as soon as possible. The Government of the United States will transmit to the other Contracting Powers a certified copy of the *procès-verbal* of the deposit of ratifications.

The present Treaty, of which the English and French texts are both authentic, shall remain deposited in the archives of the Government of the United States, and duly certified copies thereof shall be transmitted by the Government to the other Contracting Powers.

In faith whereof the above-named Plenipotentiaries have signed the present Treaty.

TREATY TO PROTECT NEUTRALS AND NON-COMBATANTS AT SEA IN TIME OF WAR AND TO PREVENT USE IN WAR OF NOXIOUS GASES AND CHEMICALS.

I.

The Signatory Powers declare that among the rules adopted by civilised nations for the protection of the lives of neutrals and non-combatants at sea in time of war, the following are to be deemed an established part of international law:—

1. A merchant vessel must be ordered to submit to visit and search to determine its character before it can be seized.

A merchant vessel must not be attacked unless it refuse to submit to visit and search after warning, or to proceed as directed after seizure.

A merchant vessel must not be destroyed unless the crew and passengers have been first placed in safety.

2. The belligerent submarines are not under any circumstances exempt from the universal rules above stated; and if a submarine cannot capture a merchant vessel in conformity with these rules the existing law of nations requires it to desist from attack and from seizure and to permit the merchant vessel to proceed unmolested.

II.

The Signatory Powers invite all other civilised Powers to express their assent to the foregoing statement of established law, so that there may be a clear public understanding throughout the world of the standards of conduct by which the public opinion of the world is to pass judgment upon future belligerents.

III.

The Signatory Powers, desiring to ensure the enforcement of the humane rules of existing law declared by them with respect to attacks upon and the seizure and destruction of merchant ships, further declare that any person in the service of any Power who shall violate any of those rules, whether or not such person is under orders of a governmental superior, shall be deemed to have violated the laws of war and shall be liable to trial and punishment as if for an act of piracy and may be brought to trial before the civil or military authorities of any Power within the jurisdiction of which he may be found.

IV.

The Signatory Powers recognise the practical impossibility of using submarines as commerce destroyers without violating, as they were violated in the recent war of 1914–1918, the requirements universally accepted by civilised nations for the protection of the lives of neutrals and non-combatants, and to the end that the prohibition of the use of submarines as commerce destroyers shall be universally accepted as a part of the law of nations they now accept that prohibition as henceforth binding as between themselves and they invite all other nations to adhere thereto.

V.

The use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices, having been justly condemned by the general opinion of the civilised world and a prohibition of such use having been declared in Treaties to which a majority of the civilised Powers are parties,

The Signatory Powers, to the end that this prohibition shall be universally accepted as a part of international law binding alike the conscience and practice of nations, declare their assent to such prohibition, agree to be bound thereby as between themselves and invite all other civilised nations to adhere thereto.

VI.

The present Treaty shall be ratified as soon as possible in accordance with the constitutional methods of the Signatory Powers and shall take effect on the deposit of all the ratifications, which shall take place at Washington.

The Government of the United States of America will transmit to all the Signatory Powers a certified copy of the *procès-verbal* of the deposit of ratifications.

The present Treaty, of which the French and English texts are both authentic, shall remain deposited in the archives of the Government of the United States of America, and duly certified copies thereof will be transmitted by that Government to each of the Signatory Powers.

VII.

The Government of the United States of America will further transmit to each of the Non-Signatory Powers a duly certified copy of the present Treaty and invite its adherence thereto.

Any Non-Signatory Power may adhere to the present Treaty by communicating an Instrument of Adherence to the Government of the United States of America, which will thereupon transmit to each of the Signatory and Adhering Powers a certified copy of each Instrument of Adherence.

In faith whereof, the above-named Plenipotentiaries have signed the present Treaty.

THE ADMIRALTY.

Offices: Whitehall, London, S.W.1.

LIST OF THE PRINCIPAL OFFICIALS.

Board.

First Lord: The Rt. Hon. L. C. M. S. Amery, M.P.
First Sea Lord and Chief of Naval Staff: Admiral of the Fleet the Earl Beatty, G.C.B., O.M., G.C.V.O., D.C.L.
Second Sea Lord and Chief of Naval Personnel: Vice-Admiral Sir Henry F. Oliver, K.C.B., K.C.M.G., M.V.O., LL.D.
Third Sea Lord and Controller: Rear-Admiral Frederick L. Field, C.B., C.M.G.
Fourth Sea Lord and Chief of Supplies and Transport: Rear-Admiral the Hon. D. E. H. Boyle, C.B., C.M.G., M.V.O.
Deputy Chief of Naval Staff: Vice-Admiral Sir Roger J. B. Keyes, Bart., K.C.B., K.C.V.O., C.M.G., D.S.O., LL.D., D.C.L.
Assistant Chief of Naval Staff: Rear-Admiral Sir Alfred E. M. Chatfield, K.C.B., K.C.M.G., C.V.O.
Civil Lord: The Marquis of Linlithgow.
Parliamentary and Financial Secretary: Commander Bolton M. Eyres-Monsell, M.P.
Permanent Secretary: Sir Oswyn A. R. Murray, K.C.B.
Deputy Secretary: Sir Charles Walker, K.C.B.
Naval Secretary to First Lord: Rear-Admiral H. D. R. Watson, C.B., C.V.O., C.B.E.

The Secretary's Department.

Deputy Secretary: Sir Charles Walker, K.C.B. *Principal Assistant Secretaries:* Sir Vincent W. Baddeley, K.C.B., and W. J. Evans, C.B., C.B.E. *Director of Establishments:* A. Flint, C.B.

Hydrographic Department.

Hydrographer: Rear-Admiral F. C. Learmonth, C.B., C.B.E. (retd.). *Assistant Hydrographer:* Captain R. W. Glennie, C.M.G. *Director of Navigation:* Captain Frederick P. Loder Simons, C.M.G. *Superintendent of Sailing Directions:* Commander B. O. M. Davy. *Superintendent of Charts:* Captain J. D. Nares, D.S.O. *Assistant Superintendent of Charts:* Hugh H. Underhill, O.B.E. *Superintendent of Tidal Work:* Commander H. D. Warburg (retd.). *Chief Civil Assistant to Hydrographer:* W. E. Llewellyn, O.B.E. *Naval Assistant in Tidal Branch:* F. D. Bangay.

Contract and Purchase Department.

Director of Navy Contracts: W. St. D. Jenkins, C.B., C.B.E. *Deputy Director:* P. Minter, C.B.E. *Assistant Directors of Contracts:* P. D. Bussell, O.B.E., G. B. Cobb, F. F. Fisher, O.B.E., E. C. Jubb, W. H. Judson, and H. W. Pillow.

Mobilisation Department.

Director: Rear-Admiral G. H. Baird, C.B. *Assistant Director:* Captain George W. MacO. Campbell.

Naval Equipment Department.

Director: Rear-Admiral Douglas L. Dent, C.B., C.M.G. *Assistant Director:* Captain H. W. Longden, C.M.G.

Compass Department,

Admiralty Compass Observatory, Ditton Park, Langley, Bucks.

Director: Captain F. O. Creagh-Osborne, C.B., R.N. (retd.). *Superintendents Gyro Branch:* Commander G. B. Harrison, O.B.E. (*Naval*), and Clifford Chauffer, M.A. (*Civil*) (*Experimental and Instructional*): *Advisor on Gyroscope Equipment:* Professor Sir James B. Henderson, K.T., D.Sc

NAVAL CONSTRUCTION DEPARTMENT.

Director: Sir Eustace H. Tennyson d'Eyncourt, K.C.B., F.R.S., D.Sc. *Director of Warship Production:* W. J. Berry, C.B. *Assistant Directors:* A. W. Johns, C.B.E., C. F. Munday, and J. H. Narbeth, C.B.E., M.V.O. *Superintendent of Admiralty Experiment Works:* M. P. Payne (*Chief Constructor*).

ENGINEER-IN-CHIEF'S DEPARTMENT.

Engineer-in-Chief of the Fleet: Engineer Vice-Admiral Robert B. Dixon, C.B. *Deputy Engineer-in-Chief:* Engineer Captain M. William Whayman, C.B.E. *Assistant Engineers-in-Chief:* Engineer Rear-Admiral John McLaurin, C.B., and Engineer Captain Lewis J. Watson, O.B.E. *Examiner of Dockyard Work:* E. Fage.

ADMIRALTY ENGINEERING LABORATORY: West Drayton, Middlesex.

Superintendent: Engineer Commander Harold B. Tostevin, D.S.O. *Chief Designer:* A. W. Newman. *Testing Engineer:* J. Aitkin.

DIRECTOR OF DOCKYARDS DEPARTMENT.

Director: Vice-Admiral Sir Lawrence E. Power, K.C.B., C.V.O. *Deputy Director:* E. A. J. Pearce, O.B.E. *Assistant Director:* Engineer Rear-Admiral Sydney Ryder, C.M.G. *Assistant Director:* J. S. Pringle, O.B.E. *Mercantile Shipbuilding Assistant:* R. C. Knight.

SIGNAL DEPARTMENT.

Director: Captain H. Kitson, R.N. *Deputy Director:* Captain James F. Somerville, D.S.O.

DOCKYARD EXPENSE ACCOUNTS DEPARTMENT,
47, Victoria Street, Westminster, London, S.W.1.

Director of Expense Accounts: F. W. W. Burrell, O.B.E. *Assistant:* J. H. Jeffery.

NAVAL STORE DEPARTMENT.

Director of Stores: John W. L. Oliver, C.B.E. *Deputy Directors:* A. E. Cocks, O.B.E. (actg.), and R. J. Hall (actg.).

NAVAL ORDNANCE, DEPARTMENT.

Director: Captain Roger R. C. Backhouse, C.B., C.M.G. *Deputy Director:* Captain George T. C. P. Swabey, D.S.O. *Superintendent of Design:* Commander Harold G. Jackson, O.B.E. (retd). *Chief Inspector of Naval Ordnance:* Commander Llewellyn E. H. Llewelyn (retd).

ARMAMENT SUPPLY DEPARTMENT.

Director: Captain Herbert R. Norbury, C.B., R.N. *Assistant Directors:* A. McFarlane, O.B.E., T. W. Midmer, O.B.E., W. A. Mortimer, O.B.E., R. W. Wharhirst, and G. E. Woodward, C.B.E.

ACCOUNTANT-GENERAL'S DEPARTMENT.

Accountant-General of the Navy: C. J. Naef, C.B.E. *Deputy Accountants-General:* T. D. James, C.B.E., and Frank Storr (actg.).

VICTUALLING DEPARTMENT.

Director: Sir J. H. Brooks, K.C.B. *Deputy-Director:* J. W. H. Culling, C.B.E. (actg.).

MEDICAL DIRECTOR-GENERAL'S DEPARTMENT.

Director-General: Surgeon Vice-Admiral Sir Robert Hill, K.C.B., K.C.M.G., C.V.O., F.R.C.S.Ed. *Deputy Director-General:* Surgeon Captain Edward Sutter, C.M.G., R.N.

PAYMASTER DIRECTOR-GENERAL'S DEPARTMENT.

Director-General: Paymaster Rear-Admiral Sir William M. C. Beresford-Whyte, K.C.B., C.M.G. *Deputy Director-General:* Paymaster Captain Philip J. H. L. Row, C.B. *Secretary to the Director-General:* Paymaster Lieut.-Commander Arthur S. Holborn, O.B.E.

ROYAL MARINE OFFICE: 23, Carlton House Terrace, London, S.W.1.

Adjutant-General: Major-General Herbert E Blumberg, C.B., R.M. *Assistant Adjutant-General:* Lieut.-Col. R. C. Temple, O.B.E. *Deputy Assistant Adjutant-General:* Lieut.-Col. R. D. Ormsby (*for Judge Advocate and other Duties*).

SCIENTIFIC RESEARCH AND EXPERIMENTAL DEPARTMENT.

Director: F. E. Smith, O.B.E., F.R.S., A.R.C.Sc. *Principal Scientific Assistant:* C. S. Wright, O.B.E., M.A. *Assistant for Outside Inventions:* Commander R. G. Hervey, O.B.E., R.N.

CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT.

Civil Engineer-in-Chief: L. H. Savile, M.I.C.E., A.I.N.A. *Personal Assistant:* J. M. Mallett, M.B.E. *Deputy Civil Engineers-in-Chief:* C. H. Colson, O.B.E., M.I.C.E., and G. H. M. Trew, O.B.E., M.I.C.E., A.R.I.B.A. *Assistant Civil Engineer-in-Chief:* E. A. W. Barnard, O.B.E., M.I.C.E.

GREENWICH HOSPITAL DEPARTMENT,
48, Cornwall Gardens, London, S.W.7.

Director: A. W. Smallwood, C.B.E. *Clerk-in-Charge:* A. A. Rutter.

ADMIRAL COMMANDING COAST GUARD AND RESERVES, OFFICE OF.
Admiralty: 58, Victoria Street, London, S.W.1.

Admiral Commanding Coast Guard and Reserves: Vice-Admiral Sir Morgan Singer, K.C.V.O., C.B. *Assistant Admiral Commanding:* Captain Edward C. Kennedy. *Secretary:* Paymaster Commander Victor C. G. Eason, O.B.E., D.S.C.

R.N. AND R.M. RECRUITING OFFICE, LONDON,
55, Whitehall, London, S.W. 1.

Recruiting Staff Officer: Major Charles Hill, R.M.L.I. (retd.).

H.M. NAUTICAL ALMANAC OFFICE: 86, Lee Road, London, S.E.3.

Superintendent: P. H. Cowell, M.A., F.R.S. *Chief Assistant:* B. F. Bawtree.

CHAPLAIN OF THE FLEET.
Royal Naval College, Greenwich, London.

Chaplain of the Fleet: The Ven. Archdeacon Charles W. C. Ingles, D.D.

NAVAL RECRUITING DEPARTMENT,
55, Whitehall, London, S.W. 1.

Director: Colonel 2nd Commandant R. H. Morgan, R.M.L.I. *Assistant and Deputy-Director:* Lieut.-Col. E. G. Wharton, O.B.E., R.M.L.I.

PHYSICAL TRAINING AND SPORTS DEPARTMENT.

Director: Captain Charles M. R. Royds, C.M.G., R.N. *Assistant Director:* Eng.-Commander Ernest W. Roberts, R.N.

COMMISSIONERS OF INCOME TAX FOR THE NAVY DEPARTMENT.

Sir Oswyn A. R. Murray, K.C.B., Sir Charles Walker, K.C.B., and C. J. Naef, C.B.E. *Clerks to Commissioners:* W. R. V. Brade and R. M. Houston.

EDUCATION DEPARTMENT.

Adviser on Education: Alexander P. McMullen, M.A. *Deputy Inspector of Naval Schools:* Vacant. *Deputy Superintendent of Naval Examinations:* Instructor Captain Alexander E. Monro, B.A.

DEPARTMENT OF THE DIRECTOR OF ELECTRICAL ENGINEERING.

Director: W. McClelland, O.B.E. *Assistant Directors:* A. D. Constable, O.B.E. (actg.), J. McCaffery, O.B.E. (actg.), and E. T. Williams, O.B.E. (actg).

DEPARTMENT OF THE DIRECTOR OF TORPEDOES AND MINING.

Director: Captain Leonard A. R. Donaldson, C.M.G. *Deputy Director:* Captain Wion de M. Egerton, D.S.O. *Assistant Director:* Captain Arthur H. Walker, O.B.E.

STATISTICS DEPARTMENT.

Director of Statistics: Paymaster Captain Charles J. E. Rotter, C.B., R.N.

ROYAL OBSERVATORY AT GREENWICH.

Astronomer Royal: Sir Frank W. Dyson, M.A., LL.D., F.R.S. *Chief Assistants:* J. Jackson and H. S. Jones, M.A., B.Sc.

OBSERVATORY AT THE CAPE OF GOOD HOPE.

Astronomer: Sydney S. Hough. *Chief Assistant:* Jacob K. E. Halm, Ph.D.

DIVISIONS OF THE NAVAL STAFF.

See also under BOARD.

OPERATIONS DIVISION.

Director: Captain Henry W. Parker, C.B. *Deputy Director:* Captain Alister F. Beal, C.M.G. *Assistant Director:* Captain Charles D. Burke.

PLANS DIVISION.

Director: Captain Alfred D. P. R. Pound, C.B. *Deputy Director:* Captain John C. Hamilton.

NAVAL INTELLIGENCE DIVISION.

Director: Rear-Admiral Maurice S. Fitzmaurice, C.B., C.M.G. *Deputy Director:* Captain Edward O. Cochrane. *Assistant Director:* Temporary Lieut.-Colonel Arthur Peel, C.M.G., R.M.L.I.

TRADE DIVISION.

Director: Captain David T. Norris, C.B., C.M.G.

LOCAL DEFENCE DIVISION.

Director: Captain the Hon. Matthew R. Best, D.S.O., M.V.O. *Deputy Director:* Captain William F. Sells, C.M.G.

GUNNERY DIVISION.

Director: Captain Bernard St. G. Collard, D.S.O. *Deputy Director:* Captain Bernard W. M. Fairbairn, O.B.E.

TORPEDO DIVISION.

Director: Captain Stanley L. Willis.

TRAINING AND STAFF DUTIES DIVISION.

Director: Captain Vernon H. S. Haggard, C.M.G., R.N. *Deputy Director:* Captain Charles A. Scott.

STANDING COMMITTEES AND BOARDS OF THE ADMIRALTY.

ORDNANCE COMMITTEE.

Ordnance Committee Office, Royal Arsenal, Woolwich, London, S.E. 10.

President: Rear-Admiral Edward M. Phillpotts, C.B. *Vice-President:* Colonel K. E. Haynes, C.M.G., C.B.E. *Range Table Officer:* Captain A. H. D. Phillips, R.A. *Assistant Range Table Officers:* Captain P. M. B. Hammond, R.A., and Lieut. E. P. Bickford, R.M.A. *Secretary:* Lieut.-Colonel H. A. Lewis, O.B.E., R.A. *Second Secretary:* Commander Frank Elliott, O.B.E., R.N.

MEDICAL CONSULTATIVE BOARD.

The Admiralty, Whitehall, London, S.W.1.

President: Surgeon Vice-Admiral Sir Robert Hill, K.C.B., K.C.M.G., C.V.O., F.R.C.S.Ed. (*Medical Director General of the Navy*). *Civilian Members:* Sir Walter Marley Fletcher, K.B.E., M.D., D.Sc., F.R.C.P., Sir George L. Cheatle, K.C.B., C.V.O., Sir J. Herbert Parsons, C.B.E., M.B., B.S., D.Sc., F.R.C.S., and Edward W. Hope, O.B.E., M.D., D.Sc., L.R.C.P. *Naval Members:* Surgeon Rear-Admiral Sir Daniel J. P. McNabb, K.B.E., C.B. *Secretary:* Surgeon Commander Harold J. Chater.

MEDICAL EXAMINING BOARD.

The Admiralty, Whitehall, London, S.W.1.

President: Surgeon Vice-Admiral Sir Robert Hill, K.C.B., K.C.M.G., C.V.O., F.R.C.S.Ed. *Medical Members:* James Galloway, M.D., F.R.C.P., F.R.C.S., and Sir Humphrey D. Rolleston, K.C.B., M.B., F.R.C.P. *Surgical Members:* J. Ernest Lane, F.R.C.S., and John Murray, M.B., F.R.C.S. *Secretary:* Surgeon Commander Harold J. Chater.

WIRELESS TELEGRAPHY BOARD.

The Admiralty, Whitehall, London, S.W.1.

Head of W. T. Board: Maj. and Bt. Lieut.-Colonel B. C. Gardiner, C.B., R.M.L.I. *Assistant to Head of W. T. Board:* Captain J. A. V. Echevarri (Air Ministry).

There are two committees attached to the Wireless Telegraphy Board, namely, the Main Committee consisting of three Naval Members, two Army Members, and two Air Force Members, and the Experimental Committee consisting of two Naval Members, One Army Member, and four Air Force Members.

VISUAL BOARD.

The Admiralty, Whitehall, London, S.W.1.

Naval Member: Commander Martin E. S. Boissier, D.S.O. *Army Member:* Lieut.-Colonel H. Clementi-Smith, D.S.O., R.E. *Air Force Member:* Flight Lieut. F. J. Linnell, R A.F.

NAVAL FORCES OF THE DOMINIONS.

ROYAL AUSTRALIAN NAVY.

Governor-General and Commander-in-Chief: His Excellency the Rt. Hon. Lord Foster of Lepe, P.C., G.C.M.G. *Naval Aides-de-Camp to the Governor-General:* Engineer Rear-Admiral Sir Wm. Clarkson, K.B.E., C.M.G., and Captain George F. Hyde.

DEPARTMENT OF DEFENCE.

Minister of State for Defence: The Hon. Walter Massey Greene, M.P. *Assistant Minister of State for Defence:* Maj.-General the Hon. Sir Granville de L. Kyrie, K.C.M.G., C.B., V.D., M.P.

NAVAL BOARD.

President: The Minister of State for Defence. *First Naval Member:* Vice-Admiral Sir Allan F. Everett, K.C.M.G., K.C.V.O., C.B. *Second Naval Member:* Commodore Charles T. Hardy, C.B.E. *Third Naval Member:* Engineer Rear-Admiral Sir Wm. Clarkson, K.B.E., C.M.G. *Finance and Civil Member:* Honorary Paymaster Captain Albert Martin, O.B.E.

NAVAL STAFF OF HIGH COMMISSIONER IN LONDON.

Australia House, London, W.C.2.

Naval Representative: Captain John R. Robbins, R.N. *Assistant Naval Representative:* Paymaster Lieut.-Commander Francis J. H. Davies, R.A.N. *Inspecting Engineer Overseer:* W. H. Woolnough.

ROYAL CANADIAN NAVY.

DEPARTMENT OF THE NAVAL SERVICE.

Minister of the Naval Service: The Hon. George P. Graham. *Deputy Minister of the Naval Service:* George J. Desbarats, C.M.G. *Director of the Naval Service:* Captain Walter Hose, C.B.E., R.N. *Assistant Director of the Naval Service:* Acting Captain Richard M. T. Stephens, C.M.G., R.C.N. *Naval Secretary:* Paymaster Commander John A. E. Woodhouse, R.N. *Consulting Naval Engineer:* Acting Engineer Commander Thomas C. Phillips, R.C.N. *Assistant Deputy Minister:* T. F. McVeigh. *Chief Accountant:* Louis J. Beausoleil. *Director of Radio-telegraphs:* Charles P. Edwards, O.B.E. *Acting Director of Stores:* Edward Lisle.

ROYAL NAVY OF NEW ZEALAND.

Governor-General and Commander-in-Chief: His Excellency Viscount Jellicoe of Scapa, G.C.B., O.M., G.C.V.O.

NAVAL BOARD.

President: The Minister of Defence (The Hon. Sir Robert H. Rhodes, M.P.). *Members:* Captain Alan G. Hotham, C.M.G., R.N. (*First Naval Member*), and Captain Hugh D. Hamilton, R.N. *Naval Secretary:* Paymaster Commander John Siddalls, O.B.E., R.N.

BRITISH AND FOREIGN NAVAL ATTACHÉS.

British Naval Attachés Accredited to Foreign Countries.

To :—

America, including the Argentine Republic, Brazil, Chile, the United States of Colombia, Cuba, Equador, Haiti, Mexico, Panama, Paraguay, Peru, San Domingo, United States, Uruguay, and Venezuela: Naval Attaché, Captain Francis L. Tottenham, C.B.E. (appointed 4th October, 1922); Assistant Naval Attaché, Engineer-Commander Harold A. Brown (appointed 15th July, 1921): Headquarters, Washington, D.C., U.S.A.

Belgium, France, Portugal and Spain : Naval Attaché, Commander Edward B. C. Dicken, D.S.C. (appointed 20th September, 1922); Headquarters, Paris, France.

Bulgaria, Greece, Italy, Roumania, and Serbia: Naval Attaché, Commander Reginald T. Down, D.S.O. (appointed 20th July, 1922); Headquarters, Rome, Italy.

China and Japan: Naval Attaché, Captain Ragnor M. Colvin, C.B.E. (appointed 10th March, 1922): Headquarters, Tokyo, Japan.

Denmark, Esthonia, Finland, Latvia, Norway and Sweden: Naval Attaché, Captain James W. Murray, D.S.O. (appointed 8th December, 1920); Headquarters, Helsingfors, Finland.

Netherlands and Poland : Naval Attaché, Captain Gerard A. Wells (appointed 1st February, 1922); Headquarters, The Hague, Holland.

Foreign Naval Attachés Accredited to Great Britain.

From :—

Argentine Republic : Naval Attaché, Captain Diego C. Garcia : Address, 59, Palace Street, Westminster, London, S.W.1.

Brazil: Naval Attaché, Captain Augusto Cesar Burlamaqui: Address, 19, Upper Brook Street, London, W.1.

Denmark: Naval Attaché, C. U. Evers : Address, 29, Pont Street, London, S.W.1.

France: Naval Attaché, Capitaine de Frégate de Ruffi de Pontevès-Gévaudan, D.S.O. : Address, Albert Gate House, Hyde Park, London, S.W.1.

Italy : Naval Attaché, Commander Luigi Bianchi : Address, 20, Grosvenor Square, London, W.1.

Japan: Naval Attaché, Rear-Admiral Tomaki Tosu, C.B.; Assistant Naval Attaché, Lieut.-Commander Minoru Sonoda: Address, Broadway Court, Broadway, Westminster, London, S.W.1.

Netherlands : Naval Attaché, Capitaine de Vaisseau K. F. Sluys : Address, 32, Green Street, Park Lane, London, W.1.

Norway : Naval Attaché, Captain Sigurd Scott-Hansen : Address, Norway House, 21–24, Cockspur Street, Westminster, London, S.W.1.

Portugal : Naval Attaché, Commander Fernando Branco : Address, 12, Taviton Street, Gordon Square, London, W.C.1.

Spain: Naval Attaché, Captain Don Eliseo Sandriz : Address, 1, Grosvenor Gardens Westminster, London, S.W.1.

Sweden : Naval Attaché, Commander A. H. de Bahr : Address, 27, Portland Place, London, W.1.

United States of America : Naval Attaché, Captain Charles L. Hussey; Assistant Naval Attachés, Commander William Norris, Commander E. C. Hamner, Jr., (CC), Commander T. A. Thomson, Jr., Lieut.-Commander N. H. White, Jr., and Lieut. J. H. Kyger (SC): Address, 6, Grosvenor Gardens, Westminster, London, S.W.1.

PROFILES OF BRITISH AND FOREIGN WARSHIPS AND MERCHANT SHIPS.

CAPITAL SHIPS.

[In order to facilitate identification, the ships are arranged in accordance with the number of funnels and masts, as these are the features most easily distinguished at a distance. The page indicated, in the case of warships, refers the reader to the table where full particulars of the ships will be found. All the profiles are drawn to the scale $\frac{1}{4}$ in. = 100 ft.]

FRANCE. Battleships. Condorcet, Diderot. (See p. 330.)

GREAT BRITAIN. Battle-cruiser. Tiger. (See p. 318.)

JAPAN. Battle-cruisers. Haruna, Hiyei, Kongo, Kirishima. (See pp. 338 and 339.)

FRANCE. Battleships. Courbet, Jean Bart, Paris. (See pp. 330 and 331.)

JAPAN. Battleship. Settsu. (See p. 339.)

JAPAN. Battleship. Aki. (See p. 338.)

GREAT BRITAIN. Battle-cruiser. Hood. (See p. 316.)

GREAT BRITAIN. Battle-cruisers. Renown, Repulse. (See p. 317.)

JAPAN. Battleships. Hyuga, Ise. (See pp. 338 and 339.)

JAPAN. Battleships. Fuso, Yamishiro. (See pp. 338 and 339.)

GREAT BRITAIN. Battleships. Barham, Malaya, Queen Elizabeth, Valiant, Warspite. (See pp. 316, 317, and 318.)

UNITED STATES. Battleships. California, Tennessee. (See pp. 347 and 351.)

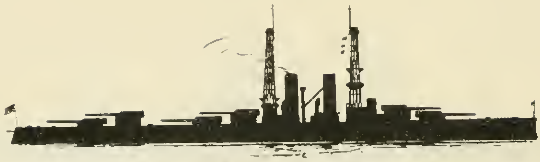
GREAT BRITAIN. Battleships. Benbow, Emperor of India, Iron Duke, Marlborough. (See pp. 316 and 317.)

GREAT BRITAIN. Battleships. Centurion, King George V. (See p. 316.)

ITALY. Battleships. Andrea Doria, Caio Duilio. (See p. 335.)

ITALY. Battleships. Conte Di Cavour, Giulio Cesare. (See p. 335.)

UNITED STATES. Battleships. New York, Texas. (See pp. 349 and 351.)



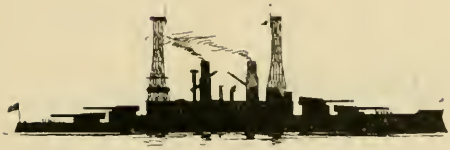
UNITED STATES. Battleships. Arkansas, Wyoming. (See pp. 347 and 351.)

FRANCE. Battleships. Bretagne, Lorraine, Provence. (See pp 330 and 331.)

UNITED STATES. Battleships. Delaware, North Dakota. (See pp. 347 and 350.)

UNITED STATES. Battleships. Florida, Utah. (See pp. 347 and 351.)

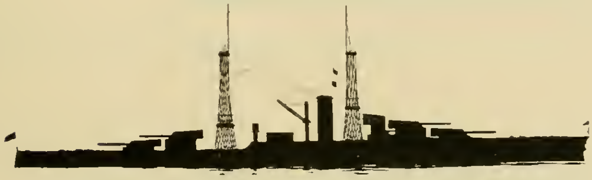
JAPAN. Battleship. Satsuma. (See p. 339.)



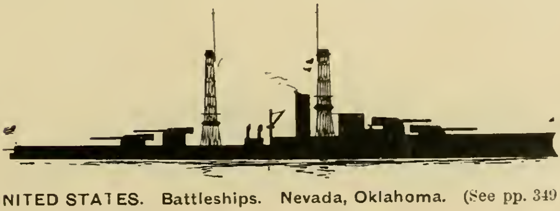
UNITED STATES. Battleships. Michigan, South Carolina. (See pp. 349 and 351.)

GREAT BRITAIN. Battleships. Ramillies, Resolution, Revenge, Royal Oak, Royal Sovereign. (See p. 317.)

UNITED STATES. Battleships. Idaho, Mississippi, New Mexico. (See pp. 348 and 349.)



UNITED STATES. Battleships. Arizona, Pennsylvania. (See pp. 347 and 350.)



UNITED STATES. Battleships. Nevada, Oklahoma. (See pp. 349 and 350.)

CRUISERS.

JAPAN. Cruisers. Chikuma, Hirado, Yahagi. (See pp. 340 and 341.)

ITALY. Cruisers. San Giorgio, San Marco. (See p. 335.)

ITALY. Scout Cruisers. Marsala, Nino Bixio. (See pp. 336 and 337.)

GREAT BRITAIN. Light Cruisers. Birmingham, Dublin, Lowestoft, Southampton. (See pp. 319, 322, and 323.)

GREAT BRITAIN. Light Cruisers. Emerald, Enterprise. (See p. 322.)

JAPAN. Light Cruisers. Tatsuta, Tenryu. (See p. 340.)

JAPAN. Armoured Cruiser. Kuma. (See p. 340.)

GREAT BRITAIN. Light Cruisers. Caroline, Cordelia, Cleopatra. (See p. 320.)

ITALY. Scout Cruiser. Quarto. (See p. 337.)

JAPAN. Second Class Cruiser. Tone. (See p. 341.)

GREAT BRITAIN. Light Cruisers. Effingham, Frobisher, Hawkins, Vindictive. (See pp. 322 and 323.)

GREAT BRITAIN. Light Cruisers. Danae, Dauntless, Delhi, Dunedin, Dragon, Durban. (See pp. 321 and 322.)

GREAT BRITAIN. Light Cruisers. Cardiff, Ceres, Coventry, Curacoa Curlew.
(See p. 321.)

GREAT BRITAIN. Light Cruisers. Cairo, Calcutta, Cape Town, Carlisle, Colombo.
(See p. 320.)

GREAT BRITAIN. Light Cruisers. Caledon, Calypso, Caradoc. (See p. 320.)

GREAT BRITAIN. Light Cruisers. Cambrian, Canterbury, Castor, Constance.
(See p. 321.)

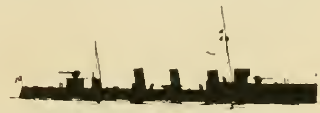
GREAT BRITAIN. Cruisers. Courageous, Glorious. (See p. 319.)

TORPEDO BOAT DESTROYERS.

UNITED STATES. Torpedo Boat Destroyers. Allen, Alywin, Conyngham. (See p. 370.)

UNITED STATES. Torpedo Boat Destroyer. Caldwell. (See p. 370.)

UNITED STATES. Torpedo Boat Destroyer. Clemson. (See p. 370.)

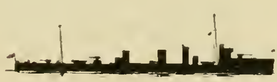


ITALY. Torpedo Boat Destroyer. Aquilone. (See p. 365.)

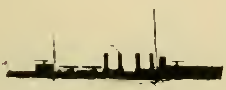
FRANCE. Torpedo Boat Destroyers. Aventurier, Intrépide, Téméraire. (See p. 363.)

FRANCE. Torpedo Boat Destroyers. Algérian, Annamite, Arabe, Bambara, Hova, Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg. (See p. 363.)

FRANCE. Torpedo Boat Destroyers. Enseigne Roux, Mécanicien Principal Lestin. (See p. 363.)



JAPAN. Torpedo Boat Destroyer. Kaba. (See p. 367.)

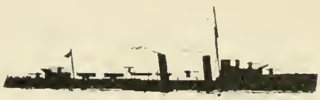


FRANCE. Torpedo Boat Destroyers. Bouclier, Casque, Cimeterre. (See p. 363.)

ITALY. Torpedo Boat Destroyers. Angelo Bassini, E. Cosenz, Francesco Stocco, Giacinto Carini, Giacomo Medici, Giovanni G. Acerbi, Giuseppe la Farina, Giuseppi la Masa, Giuseppe Sirtori, Nicola Fabrizii, Vincenzo G. Orsini.. (See p. 365.)

JAPAN. Torpedo Boat Destroyer. Amatsukaze. (See p. 367.)

ITALY. Torpedo Boat Destroyer. Carlo Mirabello. (See p. 336.)



GREAT BRITAIN. Torpedo Boat Destroyer. Broke. (See p. 360.)

GREAT BRITAIN. Torpedo Boat Destroyers. Vansittart, Venomous, Verity, Volunteer, Wanderer, Whitehall, Whitshed, Wild Swan, Wishart, Witch, Wren. (See p. 360.)

GREAT BRITAIN. Torpedo Boat Destroyers. Vancouver, Vanessa, Vanity, Vanoc, Vanquisher, Vectis, Vega, Velox, Vendetta, Venetia, Venturous, Verdun, Versatile, Vesper, Vidette, Vimiera, Violent, Vivacious, Vivien, Vortigern. (See p. 360.)

GREAT BRITAIN. Torpedo Boat Destroyers. Viceroy, Viscount, Voyager, Wakeful, Walker, Walpole, Walrus, Warwick, Watchman, Waterhen, Wessex, Westcott, Westminster, Whirlwind, Whitley, Winchelsea, Winchester, Wolfhound, Wolsey, Woolston, Wrestler, Wryneck. (See p. 360.)

JAPAN. Torpedo Boat Destroyer. Momo. (See p. 367.)

ITALY. Torpedo Boat Destroyer. Alessandro Poerio. (See p. 365.)

GREAT BRITAIN. Torpedo Boat Destroyers. Tower, Trenchant, Ulster, Umpire, Undine, Urchin, Ursa, Ursula. (See p. 360.)

GREAT BRITAIN. Torpedo Boat Destroyers. Shikari, Simoom, Tasmania, Tattoo. (See pp. 324 & 360.)

ITALY. Torpedo Boat Destroyer. Palestro. (See p. 365.)

MERCHANT SHIPS.

AQUITANIA **Cunard.** Length, 868 ft. 7 ins. ; Gross Tonnage, 45,647 ;
Funnels : Red, Black Tops.

OLYMPIC. **White Star.** Length, 852 ft. 5 ins. ; Gross Tonnage, 46,359 ;
Funnels : Buff, Black Tops.

MAURETANIA. **Cunard.** Length, 762 ft. 2 ins. ; Gross Tonnage, 30,704 ;
Funnels : Red, Black Tops.

FRANCE. **Cie. Générale Transatlantique.** Length, 689 ft. 2 ins. ; Gross Tonnage, 23,666 ;
Funnels : Red, Black Tops.

ARUNDEL CASTLE. **Union Castle** Length, 630 ft. 5 ins. Gross Tonnage, 18,980 ;
Funnels : Red, Black Tops.

MAJESTIC. White Star.—Length, 915 ft. 5 ins.; Gross Tonnage, 56,000; Funnels: Buff, Black Tops.

BERENGARIA. Cunard. Length, 883 ft. 6 ins.; Gross Tonnage, 52,022; Funnels: Red, Black Tops.

PARIS. Cie. Générale Transatlantique. Length, 735 ft. 4 ins.; Gross Tonnage, 34,568; Funnels: Red, Black Tops.

CAP POLONIA. Hamburg South Amerika. Length, 637·7 ft. Gross Tonnage, 20,576; Funnels: White, Red Tops.

EMPRESS OF CANADA. Canadian Pacific. Length, 627 ft.; Gross Tonnage, 21,517; Funnels: Yellow.

EMPRESS OF AUSTRALIA. Canadian Pacific. Length, 589 ft. 8 ins.; Gross Tonnage, 21,477; Funnels: Yellow, Black Tops.

NALDERA. Peninsular and Oriental. Length, 580 ft. 9 ins.; Gross Tonnage, 15,825
NARKUNDA ,, ,, ,, Length, 581 ft. 4 ins.; Gross Tonnage, 16,118.
Funnels: Black.

LUTETIA. Cie. Sud Atlantique. Length, 579 ft.; Gross Tonnage, 15,569; Funnels: Buff, Black Tops, Cockerel on side.

EMPRESS OF ASIA. EMPRESS OF RUSSIA. Canadian Pacific. Length, 570 ft. 1 in.; Gross Tonnage, 16,810; Funnels: Yellow.

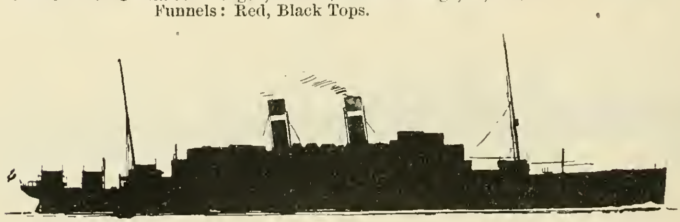
CUIDAD DE BUENOS AIRES. CUIDAD DE MONTE VIDEO. Argentine Steam Navigation Co. Length, 350 ft.; Gross Tonnage, 3,864; Funnels: Yellow, Black Tops.

ADRIATIC. White Star. Length, 709 ft. 2 ins.; Gross Tonnage, 24,541; Funnels: Buff, Black Tops.

CEDRIC. CELTIC, White Star. Length, 680 ft. 9 ins.; Gross Tonnage, 21,073; Funnels: Buff, Black Tops.

CALEDONIA. Peninsular and Oriental. Length, 486 ft.; Gross Tonnage, 7,622; Funnels: Black.

CARONIA. Cunard. Length, 650 ft.; Gross Tonnage, 19,687; Funnels: Red, Black Tops.



ROTTERDAM. Holland Amerika. Length, 650 ft.; Gross Tonnage, 23,980; Funnels: Buff, Two Blue Bands with White Band between, Buff Top.

ORMONDE. Orient. Length, 580 ft. 5 ins.; Gross Tonnage, 14,853; Funnels: Buff.

SAXON. Union Castle. Length, 570 ft. 5 ins. ; Gross Tonnage, 12,385 ; Funnels : Red, Black Tops.

ARMADALE CASTLE. Union Castle. Length, 570 ft. 1 in. ; Gross Tonnage, 12,973 : Funnels : Red, Black Tops.

BALMORAL CASTLE. EDINBURGH CASTLE. Union Castle. Length, 570 ft. ; Gross Tonnage, 13,361 ;
Funnels : Red, Black Tops.

ROCHAMBEAU. Cie. Générale Transatlantique. Length. 559 ft. ; Gross Tonnage 17,400 ; Funnels : Red, Black Tops.

ORMUZ. Orient. Length, 550 ft. ; Gross Tonnage, 14,588 ; Funnels : Buff.

MONTCALM. MONTCLARE. MONTROSE. Canadian Pacific. Length, 549 ft. 5 ins. ; Gross Tonnage, 16,418 ; Funnels : Yellow.

EMPRESS OF BRITAIN. **Canadian Pacific.** Length, 548 ft. 8 ins. ; Gross Tonnage, 15,857 ; Funnels : Yellow, Black Tops.

MALWA. MANTUA. MOREA. **Peninsular and Oriental.** Length, 540 ft. ; Gross Tonnage, 10,941 ; Funnels : Black.

ORSOVA. **Orient.** Length, 536 ft. 2 ins. ; Gross Tonnage, 12,036 ; Funnels : Buff.

ORVIETO. **Orient.** Length, 535 ft. 3 ins. ; Gross Tonnage, 12,133 ; Funnels : Buff.

OSTERLEY. **Orient.** Length, 535 ft. ; Gross Tonnage, 12,129 ; Funnels : Buff.

STAVANGERFJORD. **Norske Amerikalinje.** Length, 532 ft. Gross Tonnage, 12,977 ; Funnels : Yellow, Two Red and Two White Bands with Blue Band between.

MACEDONIA. Peninsular and Oriental. Length, 530 ft. 4 ins.; Gross Tonnage, 11,089; Funnels: Black.

ANDRE LEBON. Messageries Maritimes. Length 528 ft.; Gross Tonnage, 13,681; Funnels: Black.

NIAGARA. Union Steam Ship Co. of N.Z. Length, 524 ft. 7 ins.; Gross Tonnage, 13,415 Funnels: Red, Black Tops.

H. F. ALEXANDER. Admiral Line. Length, 509 ft. Gross Tonnage, 8,255; Funnels: Tan, Black Top, White Disc with Flag.

CHICAGO. Cie. Générale Transatlantique. Length, 508 ft.; Gross Tonnage, 14,250; Funnels: Red, Black Tops.

PAUL LECAT. Messageries Maritimes. Length, 508 ft.; Gross Tonnage, 12,988; Funnels: Black.

METAGAMA. **Canadian Pacific.** Length, 500 ft. 4 ins. ; Gross Tonnage, 12,420 ; Funnels : Yellow, Black Tops.

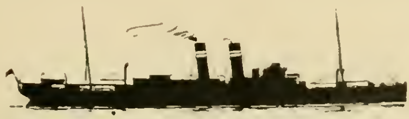
CHINA. **Peninsular and Oriental.** Length, 500 ft. 5 ins. ; Gross Tonnage, 7,952 ; Funnels : Black.

SPHINX. **Messageries Maritimes.** Length, 479 ft. ; Gross Tonnage, 11,374 ; Funnels : Black.

PORTHOS. **Messageries Maritimes.** Length, 476 ft. ; Gross Tonnage, 12,691 ; Funnels : Black.

PEROU. **Cie. Générale Transatlantique.** Length, 449 ft. ; Gross Tonnage, 6,600 ; Funnels : Red, Black Tops.

HAYTI. **Cie. Générale Transatlantique.** Length, 410 ft. ; Gross Tonnage, 6,179 ; Funnels : Red, Black Tops.



ARANKOLA. British India S.N. Co. Length, 390 ft. 3 ins. ; Gross Tonnage, 4,129 ;
Funnels : Black, Two White Bands, Black Tops.

ANGLIA. CAMBRIA. HIBERNIA. SCOTIA. London and North Western Railway Co.
Length, 380 ft. 5 ins. ; Gross Tonnage, 3,460 ;
Funnels : Yellow, Black Tops.

WAHINE. Union Steam Ship Co. of N.Z. Length, 375 ft. ; Gross Tonnage, 4,436 ;
Funnels : Red, Black Tops.

GOUVERNEUR GENERAL CHANZY. Commission aux Transports Maritimes Marine Marchand. Length, 361 ft. ; Gross Tonnage, 4,500.

ST. ANDREW. ST. DAVID. ST. PATRICK. Great Western Railway.
Length, 351 ft. 1 in. ; Gross Tonnage, 2,495 ;
Funnels : Red, Black Tops.

ARVONIA. MENEVIA. London and North Western Railway Co. Length, 329 ft. ;
Gross Tonnage, 1,842 ;
Funnels : Yellow, Black Tops.

ANTWERP. MALINES. Great Eastern Railway. Length, 321 ft. 6 ins. ; Gross Tonnage 2,957 ;
Funnels : Yellow, Black Tops.

CURRAGHMORE. **London and North Western Railway Co.** Length, 307 ft. 1 in.; Gross Tonnage, 1,587; Funnels: Yellow, Black Tops.

GREENORE. **London and North Western Railway Co.** Length, 306 ft.; Gross Tonnage, 1,488; Funnels: Yellow, Black Tops.

RATHMORE. **London and North Western Railway Co.** Length, 299 ft. 5 ins.; Gross Tonnage, 1,569; Funnels: Yellow, Black Tops.

HANTONIA. NORMANNIA. **London and South Western Railway Co.** Length, 290 ft. 3 ins.; Gross Tonnage, 1,567; Funnels: Buff.

REINDEER. **Great Western Railway Co.** Length, 280 ft.; Gross Tonnage, 1,101; Funnels: Red, Black Tops.

DIEPPE. **London, Brighton, and South Coast Railway Co.** Length, 273 ft. 5 ins.; Gross Tonnage, 1,228; Funnels: White, Black Tops.

SHROPSHIRE. **Federal S.S. Co.** Length, 526 ft. 4 ins.; Gross Tonnage, 12,184; Funnel: Buff.

BARONESA. **Furness (Houlder).** Length, 431 ft.: Gross Tonnage, 8,663; Funnel: Black, Red Band, White Maltese Cross, Black Top.

SAXONIA. **Cunard.** Length, 580 ft.; Gross Tonnage, 14,197;
Funnel: Red, Black Top.

ARMAGH. **Union Steam Ship Co. of N.Z.** Length, 535 ft. 5 ins.; Gross Tonnage, 12,269;
Funnel: Red, Black Top.

PRESIDENT ROOSEVELT. **United States Shipping Board.** Length, 535 ft.; Gross Tonnage, 14,127;
Funnel: Red, White Band, Blue Top, U.S.A. Shield on side.

ATHENIC. **Shaw, Savill, and Albion Co.** Length, 500 ft. 3 ins.; Gross Tonnage, 12,366;
Funnel: Buff, Black Top.

YORKSHIRE. **Bibby Line.** Length, 482 ft. 4 ins.; Gross Tonnage, 10,250;
Funnel: Salmon Pink, Black Top.

LANCASHIRE. **Bibby Line.** Length, 482 ft. 4 ins.; Gross Tonnage, 9,445;
Funnel: Salmon Pink, Black Top.

MENOMINEE. **Atlantic Transport.** Length, 475 ft.; Gross Tonnage, 6,919;
Funnel: Red, Black Top.

OXFORDSHIRE. Bibby Line. Length, 474 ft. 7 ins. ; Gross Tonnage, 8,624 ; Funnel : Salmon Pink, Black Top.

WARWICKSHIRE. Bibby Line. Length, 470 ft. 3 ins. ; Gross Tonnage, 8,012 ; Funnel : Salmon Pink, Black Top.

LEITRIM. Union Steam Ship Co. of N.Z. Length, 470 ft. ; Gross Tonnage, 9,540 : Funnel : Red, Black Top.

GLOUCESTERSHIRE. Bibby Line. Length, 467 ft. 2 ins. ; Gross Tonnage, 8,124 ; Funnel : Salmon Pink, Black Top.

LEICESTERSHIRE. Bibby Line. Length, 467 ft. 2 ins. ; Gross Tonnage, 8,059 ; Funnel : Salmon Pink, Black Top.

HEREFORDSHIRE. Bibby Line. Length 452 ft. 3 ins. ; Gross Tonnage, 7,192 ; Funnel : Salmon Pink, Black Top.

DERBYSHIRE. Bibby Line. Length, 452 ft. ; Gross Tonnage, 6,776 ; Funnel : Salmon Pink, Black Top.

FRANCONIA. LACONIA. SAMARIA. SCYTHIA. Cunard. Length, 600 ft. ; Gross Tonnage, 20,000 ;
Funnel : Red, Black Top.

TYRRHENIA. Cunard. Length, 578 ft. ; Gross Tonnage, 16,700 ;
Funnel : Red, Black Top.

EURIPIDES. Aberdeen Line. Length. 570 ft ; Gross Tonnage, 15,000 ;
Funnel : Ochre.

NESTOR. ULYSSES. Blue Funnel Line. Length, 563 ft. 2 ins. ; Gross Tonnage, 14,547 ;
Funnel : Blue, Black Top.

MEGANTIC. White Star. Length, 550 ft. 4 ins. ; Gross Tonnage, 14,878 ;
Funnel : Buff, Black Top.

ALMANZORA. Royal Mail Steam Packet Co. Length, 550 ft. 3 ins. ; Gross Tonnage, 16,034 ;
Funnel : Buff.

ORDUNA. Royal Mail Steam Packet Co. Length, 550 ft. 3 ins.; Gross Tonnage, 15,499; Funnel: Buff.

ORBITA. ORCA. Royal Mail Steam Packet Co. Length, 550 ft. 3 ins.; Gross Tonnage, 15,486; Funnel: Buff.

TRANSYLVANIA. Anchor Line. Length, 550 ft.; Gross Tonnage, 17,250; Funnel: Black, White Band, Black Top.

MOLDAVIA. Peninsular and Oriental. Length, 550 ft.; Gross Tonnage, 15,800; Funnel: Black.

BETHORE. Ore Steamship Co., N.Y. Length, 550 ft.; Gross Tonnage, 14,899.

ESPERANCE BAY. HOBSONS BAY. JERVIS BAY. LARGS BAY. MORETON BAY. Commonwealth Government Line. Length, 548 ft.; Gross Tonnage, 16,500; Funnels: Yellow.

OROPESA. Pacific Steam Navigation Co. Length, 530 ft.; Gross Tonnage, 14,072; Funnel: Buff.

SAN FRATERNO. SAN GREGORIO. SAN JERONIMO. SAN LORENZO. SAN MELITO. SAN NAZARIO. SAN PATRICIO. Eagle Oil Transport Co.
Length, 527 ft. 3 ins. ; Gross Tonnage, 11,929 ;
Funnel : Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.

ATHENIA. Anchor (Donaldson). Length, 520 ft. ; Gross Tonnage, 12,000 ;
Funnel : Black, White Band, Black Top.

BARADINE. Peninsular and Oriental. Length, 519 ft. 9 ins. ; Gross Tonnage, 13,300 ;
Funnel : Black.

DIOGENES. SOPHOCLES. Aberdeen Line. Length, 518 ft. ; Gross Tonnage, 12,500 ;
Funnel : Ochre.

MANGALORE. MATHURA. Anchor Brocklebank. Length, 518 ft. Gross Tonnage, 9,751
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.

MALANCHA. Anchor Brocklebank. Length, 518 ft. ; Gross Tonnage, 10,572
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.

MACHARDA. **Anchor Brocklebank Line.** Length, 518 ft. ; Gross Tonnage, 10,464 ; Funnel : Black, White Band, Blue and White Stripe Band, Black Top.

FUSHIMI MARU. SUWA MARU. **Nippon Yusen Kaisha.** Length, 516 ft. ; Gross Tonnage, 10,938 ; Funnel : Black.

ARAGUAYA. **Royal Mail Steam Packet Co.** Length, 515 ft. 2 ins. ; Gross Tonnage, 10,530 ; Funnel : Buff.

VANDYCK. **Lamport and Holt.** Length, 510 ft. ; Gross Tonnage, 13,233 ; Funnel : Blue, White Band, Black Top.

ACHILLES. TYNDAREUS. **Blue Funnel Line.** Length, 507 ft. ; Gross Tonnage, 11,426 ; Funnel : Blue, Black Top.

DEMOSTHENES. THEMISTOCLES. **Aberdeen Line.** Length, 506 ft. 6 ins. Gross Tonnage, 11,223 ; Funnel : Ochre.

GLENGARRY. GLENAPP. GLENOGLE. **Glen Line.** Length, 485 ft. ; Gross Tonnage, 6,802 ; Funnel : Red, Black Top.

DINTELDYK. **Holland Amerika.** Length, 485 ft. ; Gross Tonnage, 8,400 ; Funnel : Buff, Two Blue Bands, White between, Buff Top.

M.S. LOCHKATRINE. **Royal Mail Steam Packet Co.** Length, 485 ft. ; Gross Tonnage, 9,409 ; Funnel : Buff.

PORT MELBOURNE. PORT NAPIER. PORT SYDNEY. **Commonwealth and Dominion Line.** Length, 501 ft. 3 ins. ; Gross Tonnage, 9,152. Funnel : Red, Black Top.

DARRO. DEMERARA. DESEADO. DESNA. **Royal Mail Steam Packet Co.** Length, 500 ft. 7 ins. ; Gross Tonnage, 11,477 ; Funnel : Buff.

LLANSTEPHAN CASTLE. **Union Castle Line.** Length, 500 ft. 5 ins. ; Gross Tonnage. 11,293 ; Funnel : Red, Black Top.

BELTANA. BENALLA. BERRIMA. BORDA. **Peninsular and Oriental.** Length, 500 ft. ; Gross Tonnage, 11,120 ; Funnel : Black.

GLENIFFER. Glen Line. Length, 500 ft.; Gross Tonnage, 9,429;
Funnel: Red, Black Top.

MAIDAN. Anchor Brocklebank Line. Length, 500 ft. Gross Tonnage, 8,205;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

MAGDAPUR. MANIPUR. Anchor Brocklebank Line. Length, 499 ft. 6 ins.
Gross Tonnage, 9,237;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

AENEAS. ANCHISES. ASCANUS. Blue Funnel Line. Length, 493 ft.; Gross Tonnage, 10,049
Funnel: Blue, Black Top.

CALCHAS. Blue Funnel Line. Length, 490 ft. 8 ins.; Gross Tonnage, 10,304;
Funnel: Blue, Black Top.

CITY OF EXETER. Ellerman City Line. Length, 486 ft. 7 ins.; Gross Tonnage, 9,447;
Funnel: Buff, White Band, Black Top.

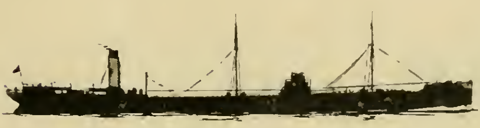
CITY OF PARIS. Ellerman City Line. Length, 484 ft. 7 ins.; Gross Tonnage, 10,245; Funnel: Buff, White Band, Black Top.

PORT ADELAIDE. PORT BUCKLAND. PORT BOWEN. PORT CAMPBELL. PORT CAROLINE. PORT DARWIN. PORT DENISON. PORT HUNTER. PORT KEMBLA. PORT NICHOLSON. Commonwealth and Dominion Line. Length, 481 ft. 2 ins. Gross Tonnage, 8,422; Funnel: Red, Black Top.

NEURALIA. NEVASA. British India S.N. Co, Length, 480 ft. 5 ins.; Gross Tonnage, 9,082; Funnel: Black, Two White Bands, Black Top.

KASHGAR KASHMIR. Peninsular and Oriental. Length, 479 ft. 9 ins.; Gross Tonnage, 8,840; Funnel: Black.

ITY OF SIMLA. Ellerman City Line. Length, 476 ft. 7 ins.; Gross Tonnage, 9,468; Fnnnel: Buff, White Band, Black Top.



IROQUOIS. Anglo American Oil Co. Length, 476 ft. 3 in.; Gross Tonnage, 9,202; Funnel: Red, Black Top.

DUNLUCE CASTLE. DURHAM CASTLE. Union Castle
Length, 475 ft. 5 ins.; Gross Tonnage, 8,130;
Funnel: Red, Black Top.

MAHSUD. MAIHAR. MALAKAND. MANAAR. MATHERAN. Anchor Brocklebank.
Length, 470 ft. 4 ins.; Gross Tonnage, 8,077;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

DELTA. DEVANHA. DONGOLA. Peninsular and Oriental.
Length, 470 ft. 3 ins.; Gross Tonnage, 8,097;
Funnel: Black.

MALAKUTA. Anchor Brocklebank. Length, 470 ft. 2 ins.; Gross Tonnage, 7,205;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

CALAMARES. United Fruit Carriers. Length, 470 ft.; Gross Tonnage, 7,782.
PASTORES. ,, ,, ,, Length, 470 ft.; Gross Tonnage, 7,242.

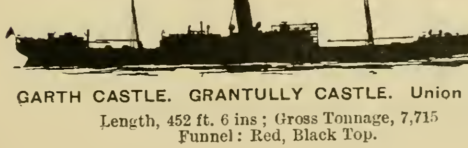
MADURA. MALDA. MANTOLA. MATIANA. British India S.N. Co. Length, 465 ft. 2 ins.;
Gross Tonnage, 8,975.
Funnel: Black, Two White Bands, Black Top.

ARAWA. TAINUI. Shaw, Savill, and Albion Co. Length, 460 ft. ; Gross Tonnage, 9,372 ;
Funnel : Buff, Black Top.

AGAPENOR. ELPENOR. EUMAEUS. GLAUCUS. HELENUS. LYCAON. MACHAON. MENTOR. PHEMUS. PYRRHUS. TEIRESIAS. TROILUS. Blue Funnel Line.
Length, 455 ft. 2 ins. ; Gross Tonnage, 7,587 ;
Funnel : Blue, Black Top.

KONINGEN DER NEDERLANDEN. Stoomvaart Maatschappy.
Length, 455 ft. ; Gross Tonnage, 8,300 ;
Funnel : Buff, Black Top.

CLAN MACTAGGART. Clan Line. Length, 452 ft. 7 ins. ; Gross Tonnage, 7,602 ;
CLAN MACTAVISH. ,, ,, Length, 469 ft. ; Gross Tonnage, 7,619 ;
Funnel : Black, two Red Bands.



GARTH CASTLE. GRANTULLY CASTLE. Union Castle.

Length, 452 ft. 6 ins ; Gross Tonnage, 7,715
Funnel : Red, Black Top.

M.S. ABA. Elder Dempster. Length, 450 ft. 3 ins.; Gross Tonnage, 7,938; Funnel: Buff.

M.S. DORSETSHIRE. M.S. SOMERSETSHIRE. Bibby Line. Length, 450 ft. 3 ins.; Gross Tonnage, 7,500; Funnel: Salmon Pink, Black Top.

PLASSY. Peninsular and Oriental. Length, 450 ft. 3 ins.; Gross Tonnage, 7,393; Funnel: Black.

SARDINIA. SICILIA. SOMALI. SOUDAN. SYRIA. Peninsular and Oriental. Length, 450 ft. 2 ins.; Gross Tonnage, 6,684; Funnel: Black.

M.S. DOMALA, British India S.N. Co. Length, 450 ft.; Gross Tonnage, 8,441; Funnel: Black, Two White Bands, Black Top.

LONDON MARU. PARIS MARU. Osaka Shosen Kaisha. Length, 450 ft.; Gross Tonnage, 7,600; Funnel: Black, Japanese Flag on Side.

MAKURA. Union Steam Ship Co. of N.Z. Length, 450 ft.; Gross Tonnage, 8,075; Funnel: Red, Black Top.

BAKARA. BARAMBAH. BOONAH. Commonwealth Government Line.
Length, 450 ft.; Gross Tonnage, 5,970;
Funnel: Black.

NANKIN. NOVARA. Peninsular and Oriental. Length, 449 ft. 7 ins.; Gross Tonnage, 7,058;
Funnel: Black.

MASIRAH. Anchor Brocklebank Line. Length, 448 ft.; Gross Tonnage, 6,836;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

ANCHORIA. Anchor Brocklebank Line. Length, 446 ft. 4 ins.; Gross Tonnage, 6,112;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

MAHRATTA. MAKALLA. Anchor Brocklebank Line. Length, 445 ft.; Gross Tonnage, 6,690;
Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

HILDEBRAND. Booth Line. Length, 440 ft. 3 ins.; Gross Tonnage, 6,995;
Funnel: Black.

BRITISH MERCHANT. British Tanker Co. Length, 440 ft.; Gross Tonnage, 7,400;
Funnel: Black, Two Red Bands, White Disc, B.T.C. in centre.

CLAN COLQUHOUN. CLAN URQUHART. Clan Line. Length, 440 ft. ;
Gross Tonnage, 5,856 ;
Funnel : Black, Two Red Bands.

CITY OF NORWICH. Ellerman (Hall Line). Length, 434 ft. 4 ins. ; Gross Tonnage, 6,726 ;
Funnel : Buff, White Band, Black Top.

TAKADA. TANDA. British India S.N.Co. Length, 430 ft. 1 in. ; Gross Tonnage, 6,949 ;
Funnel : Black, Two White Bands, Black Top.

M.S. LEIGHTON. M.S. LINNELL. Lamport and Holt. Length, 430 ft. ; Gross Tonnage, 7,412 ;
Funnel : Light Blue, White Band, Black Top.

HARDWICKE GRANGE. Furness Withy (Houlder). Length, 430 ft. ; Gross Tonnage, 9,005 ;
Funnel : Black, Red Band with White Maltese Cross, Black Top.

MARQUESA. Furness (Houlder). Length, 430 ft. ; Gross Tonnage, 8,979 ;
Funnel : Black, Red Band with White Maltese Cross, Black Top.

BAYANO. CAMITO. CORONADO. Elders and Fyffes.
Length, 425 ft. 5 ins. ; Gross Tonnage, 6,788 ;
Funnel : Buff, Black Top.

STOCKWELL. Anchor Brocklebank Line. Length, 425 ft. ; Gross Tonnage, 5,643 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.

CAIRNROSS. Cairns, Noble & Co. Length, 425 ft. ; Gross Tonnage, 5,494 ;
Funnel : Black, Red Band, White Triangle.

KARAGOLA. British India S.N. Co. Length, 425 ft. ; Gross Tonnage, 7,053 ;
Funnel : Black, Two White Bands, Black Top.

TUSCARORA. Anglo American Oil Co. Length, 425 ft. ; Gross Tonnage, 7,106 ;
Funnel : Red, Black Top.

M.S. NARRAGANSETT. M.S. SEMINOLE. Anglo American Oil Co.
Length, 425 ft. ; Gross Tonnage, 6,889 ;
Funnel : Red, Black Top.

DONGARRA. Commonwealth Government Line. Length, 422 ft. ; Gross Tonnage, 5,601 ;
Funnel : Black.

KAROOLA. McIlwraith, McEacharn. Length, 420 ft. 5 ins. ; Gross Tonnage, 7,391 ;
Funnel : Red, Black Top.

MARAMA. **Union Steamship Co. of N.Z.** Length, 420 ft. 3 ins. ; Gross Tonnage, 6,497 ; Funnel : Red, Black Top.

SAN DUNSTANO. SAN EDUARDO. SAN RICARDO. SAN SILVESTRE. SAN TIRSO. SAN VALERIO. SAN ZEFERINO. **Eagle Oil Transport Co., Ltd.** Length, 420 ft. 2 ins. ; Gross Tonnage, 6,220 ; Funnel : Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.

M.S. DOMINION MILLER. **Furness Withy.** Length, 420 ft. ; Gross Tonnage, 5,070 ; Funnel : Black, Red Band, Black Band, Black Top.

CAIRNVALONA. **Cairns, Noble & Co.** Length, 415 ft. 2 ins. ; Gross Tonnage, 4,929 ; Funnel : Black, Red Band, White Triangle.

FORT ST. GEORGE. FORT VICTORIA. **Furness Withy.** Length, 411 ft. 3 ins. ; Gross Tonnage, 7,785 ; Funnel : Black, Red, Thin Black and Red Bands, Black Top.

ERINPURA. **British India S.N. Co.** Length, 411 ft. ; Gross Tonnage, 5,128 ; Funnel : Black, Two White Bands, Black Top.

ZEALANDIA. **Huddart, Parker.** Length, 410 ft.; Gross Tonnage, 7,000; Funnel: Yellow.

CLAN MACNAB. CLAN MACNAIR. CLAN MACNAUGHTON. CLAN MACNEIL. CLAN MONROE. CLAN MORRISON. CLAN MURDOCH. CLAN MURRAY. **Clan Line.** Length, 410 ft. 6 ins.; Gross Tonnage, 6,114; Funnel: Black, Two Red Bands.

MEDIA. **Anchor Brocklebank.** Length, 410 ft.; Gross Tonnage, 5,437; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.

OCEAN PRINCE. **Furness Withy.** Length, 410 ft.; Gross Tonnage, 5,212; Funnel: Black, Red, Thin Black and Red Bands, Black Top.

ELLENGA. **British India S.N. Co.** Length, 410 ft.; Gross Tonnage, 5,196; Funnel: Black, Two White Bands, Black Top.

EBOE. **Elder Dempster.** Length, 405 ft. 1 in.; Gross Tonnage, 4,866; Funnel: Buff.

HIGHLAND LADDIE. Nelson. Length, 405 ft. ; Gross Tonnage, 7,381 ;
HIGHLAND LOCH. ,, Length, 413 ft. ; Gross Tonnage, 7,493 ;
HIGHLAND PIPER. ,, Length, 413 ft. ; Gross Tonnage, 7,490 ;
Funnel : Red, Two White Bands, Black Between, Black Top.

M.S. LOUISIANA. Det Forenede Dampskibs Selskab. Length, 405 ft. ; Gross Tonnage, 6,513 ;
Funnel : Flamingo, Red, Black Top.

DAGHESTAN. Oil Tanker. Hindustan Steam Shipping Co. Length, 405 ft. ;
Gross Tonnage, 5,742 ;
Funnel: Black, Two White Bands, Vermilion Between, C in White.

HOLYWELL. Anchor Brocklebank. Length, 401 ft. 8 ins. ; Gross Tonnage, 4,867 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.

CARAQUET. CHALEUR. CHAUDIERE. CHIGNECTO. Royal Mail Steam Packet Co.
Length, 400 ft. 5 ins. ; Gross Tonnage, 4,890 ;
Funnel : Buff.

ABINSI. Elder Dempster. Length, 400 ft. 5 ins. ; Gross Tonnage, 6,365 ;
Funnel : Buff.

ARIANO. Gulf Line. Length, 400 ft. 4 ins. ; Gross Tonnage, 5,155 ;
Funnel : Black, Wide Red Band, Narrow Red Band Below.

NORWEGIAN. **Leyland Line.** Length, 400 ft. 2 ins. ; Gross Tonnage, 6,357 ;
Funnel : Buff, Black Top.

MANISTEE. PATIA. ZENT. **Elders and Fyffes.** Length, 400 ft. 2 ins. ; Gross Tonnage, 5,360 ;
Funnel : Buff, Black Top.

EDAVANA, ELEPHANTA. **British India S.N. Co.** Length, 400 ft. ; Gross Tonnage, 5,284 ;
Funnel : Black, Two White Bands, Black Top.

ANSELM. **Booth Line.** Length, 400 ft. ; Gross Tonnage, 5,450 ;
Funnel : Black.

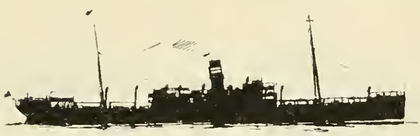
CAIRNDHU. **Cairns, Noble & Co.** Length, 399 ft. 3 ins. ; Gross Tonnage 5,250 ;
CAIRNGOWAN. ,, ,, Length, 400 ft. ; Gross Tonnage, 5,295 ;
Funnel : Black, Red Band, White Triangle.

M.S. LULE. **Grängesberg Oxelösund Co.** Length, 399 ft. ; Gross Tonnage, 5,630 ;
Funnel : Buff, Blue Band, Gold Emblem.

ANGORA. **British India S.N. Co.** Length, 390 ft. 8 ins. ; Gross Tonnage, 4,298 ;
Funnel : Black, Two White Bands, Black Top.

CAIRNMONA. Cairns, Noble & Co. Length, 390 ft. 2 ins. ; Gross Tonnage, 4,666 ; Funnel : Black, Red Band, White Triangle.

ARONDA. British India S.N. Co. Length, 390 ft. 2 ins. ; Gross Tonnage 4,062 ; Funnel : Black, Two White Bands, Black Top.



VARELA. VARSOVA. VITA. British India S.N. Co. Length, 390 ft. 1 in. ; Gross Tonnage, 4,645 ; Funnel : Black, Two White Bands, Black Top.

OLJAREN. Transatlantic S.S. Co. Length, 389 ft. ; Gross Tonnage, 5,450 ;

COOEE. Commonwealth Government Line. Length, 387 ft. 8 ins. ; Gross Tonnage, 4,255 ; Funnel : Black.

SCATWELL. Cairns, Noble & Co. Length, 385 ft. ; Gross Tonnage, 4,425 ; Funnel : Black, Red Band, White Triangle.

DENIS. STEPHEN. Booth Line. Length, 376 ft. 4 ins. ; Gross Tonnage, 4,435 ; Funnel : Black.

AIDAN. **Booth Line.** Length, 375 ft. 9 ins.; Gross Tonnage, 4,545; Funnel: Black.

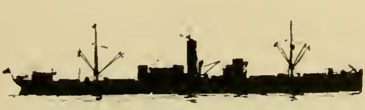
PARATTAH. **Commonwealth Government Line.** Length, 375 ft. 6 ins.; Gross Tonnage, 4,229; Funnel: Black.

ALBAN. **Booth Line.** Length, 375 ft. 2 ins.; Gross Tonnage, 5,223; Funnel: Black.

SANTA AURORA. **Eagle Oil Transport Co., Ltd.** Length, 367 ft. 5 ins.; Gross Tonnage, 4,278; Funnel: Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.

TOROMEO. **Commonwealth Government Line.** Length, 360 ft.; Gross Tonnage, 4,149; Funnel: Black.

JOHN W. MACAY. **Commercial Cable Co., N.Y.** Length, 360 ft. Gross Tonnage, 4,049; Funnel: Buff, Black Top.



CUTHBERT. **JUSTIN,** **Booth Line.** Length, 355 ft. Gross Tonnage, 3,843. Funnel: Black.

BRITISH COMMERCE. BRITISH ENTERPRISE. BRITISH TRADER. British Tanker Co.
Length, 351 ft. 4 ins.; Gross Tonnage, 4,205;
Funnel: Black, Two Red Bands, White Disc, B.T.C. in centre.

REGELE CAROL I. Roumanian State. Length, 350 ft.; Gross Tonnage, 2,370;
Funnel: White, Black Top.

M.S. MALIA. Anchor Brocklebank. Length, 350 ft. 5 ins.; Gross Tonnage, 3,872;
Funnel: Black, White Band, Blue and White Striped Band, Black Top.

BENEDICT. Booth Line. Length, 345 ft.; Gross Tonnage, 3,457;
Funnel: Black.

POLYCARP. Booth Line. Length, 340 ft. 7 ins.; Gross Tonnage, 3,577;
Funnel; Black.

BARODA. British India S.N. Co. Length, 330 ft. 4 ins.; Gross Tonnage, 3,172;
Funnel: Black, Two White Bands, Black Top.

DOMINIC. DUNSTAN. Booth Line. Length, 322 ft.; Gross Tonnage, 2,966;
Funnel: Black.

MICHAEL. Booth Line. Length, 300 ft. 5 ins.; Gross Tonnage, 3,172; Funnel: Black.

SLIEVEBAWN. SLIEVEMORE. London and North Western Railway Co.
Length, 300 ft. 2 ins.; Gross Tonnage, 1,061;
Funnel: Yellow, Black Top.

SLIEVE DONARD. London and North Western Railway Co.
Length, 300 ft.; Gross Tonnage, 1,116;
Funnel: Yellow, Black Top.

SNOWDEN. London and North Western Railway Co. Length, 299 ft. 9 ins.; Gross Tonnage, 1021;
SOUTH STACK. ,, ,, Length, 299 ft.; Gross Tonnage, 977;
Funnel: Yellow, Black Top.

SLIEVEGALLION. London and North Western Railway Co.
Length, 299 ft. 5 ins.; Gross Tonnage, 1,071;
Funnel: Yellow, Black Top.

PRINCESS ADELAIDE.—Canadian Pacific. Length, 290 ft. 5 ins.; Gross Tonnage, 3,061;
Funnel: Yellow.

M.S DUMRA. British India S.N. Co. Length, 280 ft.; Gross Tonnage, 2,000;
Funnel: Black, Two White Bands, Black Top.

GALTEE MORE. ROSSTREVOR. London and North Western Railway Co.
Length, 276 ft. 1 in. ; Gross Tonnage, 1,112 ;
Funnel : Yellow, Black Top.

CADILLAC. SARANAC. Anglo American Oil Co. Length, 530 ft. 2 ins. ;
Gross Tonnage, 12,074 ;
Funnel : Red, Black Top.

BARGE NAVAHOE. Anglo American Oil Co. Length, 450 ft. ; Gross Tonnage, 7,718.

APPENDIX TO MERCHANT SHIPPING SECTION.

MERCHANT SHIPPING OF THE WORLD.

NUMBER AND TONNAGE OF MERCHANT VESSELS LAUNCHED.*

	1900.		1910.		1913.		1919.		1920.		1921.	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
United Kingdom	692	1,442,471	500	1,143,169	688	1,932,153	612	1,620,442	618	2,055,624	426	1,538,052
British Dominions	40	9,563	60	26,343	91	48,339	263	358,728	103	203,644	54	129,675
United States	235	333,527	195	331,318	205	276,448	1051	4,075,385	509	2,476,253	173	1,006,413
Austria-Hungary	12	14,889	8	14,304	17	61,757	—	—	—	—	—	—
Denmark	17	11,060	18	12,154	31	40,932	46	37,766	30	60,669	37	77,238
Holland	61	45,074	105	70,945	95	104,296	100	137,086	99	183,149	98	232,402
France	66	116,858	55	80,751	89	176,095	34	32,663	50	93,449	65	210,663
Germany	93	204,731	117	159,303	162	465,226	No returns.		No returns.		242	509,064
Italy	36	67,522	21	23,019	38	50,356	32	82,713	82	133,190	85	164,748
Japan	3	4,543	70	30,215	152	64,664	133	611,883	140	456,642	43	227,425
Norway	42	32,751	64	36,931	74	50,637	82	57,578	30	38,855	35	51,458
Russia	37	7,240	14	4,395	10	3,300	—	—	—	—	—	—
Spain	2	2,572	1	3,234	12	8,488	41	52,609	13	45,950	11	47,256
Sweden	19	5,735	17	8,904	25	18,524	53	50,971	46	63,823	27	65,911
Other Countries	9	5,627	32	12,868	61	31,667	36	26,725	39	50,418	81	81,374
World's Total	1364	2,304,163	1277	1,957,853	1750	3,332,882	2483	7,144,549	1759	5,861,666	1377	4,341,679

* Figures given include all steamers and sailing vessels of 100 gross tons and upwards.

MERCHANT VESSELS UNDER CONSTRUCTION.*

	1900		1910.		1913.		1919.		1920.		1921.	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
United Kingdom	443	1,269,919	363	1,131,503	513	1,956,606	757	2,994,249	921	3,708,916	515	2,640,319
British Dominions	—	—	16	12,231	38	38,785	113	251,480	74	186,655	34	66,469
United States	54	197,888	59	96,289	66	147,597	647	2,966,515	235	1,310,312	43	216,428
Austria-Hungary	4	13,700	13	38,320	16	63,300	—	—	—	—	—	—
Denmark	8	10,703	8	9,625	12	25,362	56	100,335	57	121,279	27	63,070
Holland	24	32,447	24	47,620	41	126,867	126	328,338	174	450,964	123	313,879
France	41	121,158	24	109,106	39	229,020	65	216,775	104	397,969	76	352,635
Germany	70	203,984	63	160,932	102	544,682	No returns.		No returns.		No returns.	
Italy	30	87,720	6	15,505	23	53,809	125	314,547	159	363,784	122	393,832
Japan	7	18,034	28	33,058	14	47,797	64	309,474	59	248,513	35	144,912
Norway	22	19,680	27	20,920	49	42,614	61	92,719	59	83,928	40	61,559
Russia	—	—	—	—	1	5,620	—	—	—	—	—	—
Spain	2	2,500	1	3,838	3	6,855	28	107,463	27	89,340	16	69,937
Sweden	7	3,315	7	11,585	18	18,400	67	110,765	64	122,578	33	78,269
Other Countries	12	11,190	14	8,580	19	23,829	29	68,703	47	95,540	62	55,784
World's Total	724	1,992,238	653	1,699,112	954	3,331,143	2138	7,861,363	1980	7,179,778	1126	4,457,093

* The figures give the number and aggregate gross tonnage of steamers, motor ships, and sailing vessels under construction on December 31st of each year.

ANNUAL MERCHANT SHIPPING LOSSES OF THE WORLD.*

	1900.			1910.			1913.			1919.			1920.			1921.		
	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.	No.	Tonnage.	% of Tonnage owned.
United Kingdom .	213	245,645	1·86	129	222,069	1·27	113	199,453	1·07	99	151,653	·92	99	131,481	·72	74	72,104	·37
British Dominions	45	25,467	2·50	44	27,858	1·86	37	20,091	1·16	89	52,539	2·56	64	29,022	1·39	82	58,687	2·35
United States . .	99	56,154	2·76	75	50,996	1·82	91	71,469	2·38	115	150,272	1·15	108	159,694	1·16	72	107,145	·73
Austria-Hungary .	5	2,146	·52	2	3,210	·41	3	5,536	·55	—	—	—	—	—	—	—	—	—
Denmark . . .	29	13,136	2·53	11	9,506	1·29	13	6,583	·86	15	5,295	·75	22	6,646	·83	13	8,386	·87
Holland . . .	8	5,026	·95	4	8,121	·80	4	1,340	·10	23	11,550	·73	15	4,417	·25	2	602	·03
France	49	51,525	3·82	31	20,789	1·10	30	34,506	1·57	34	40,420	1·81	40	63,866	1·97	39	37,956	1·04
Germany . . .	58	50,578	1·91	39	44,233	1·02	31	56,379	1·11	50	24,167	—	19	10,280	1·53	22	11,265	1·57
Italy	47	36,577	3·72	17	18,534	1·40	26	26,881	1·77	8	3,096	·23	10	13,287	·59	27	33,090	1·25
Japan	—	—	—	22	21,505	†	25	25,514	†	38	41,418	†	29	41,988	†	29†	51,185†	1·53†
Norway . . .	152	98,367	6·0	73	67,971	3·37	61	60,648	2·47	41	44,132	2·37	42	52,648	2·37	27	46,829	1·81
Russia . . .	32	13,698	1·9	31	19,441	2·19	29	23,894	2·45	4	4,771	·88	7	15,529	2·91	—	—	—
Spain	19	23,315	3·36	15	17,599	2·30	13	15,928	1·89	16	9,752	1·30	18	14,826	1·49	35	55,560	4·77
Sweden	40	14,651	2·3	31	15,260	1·66	30	17,327	1·65	38	29,021	2·92	23	23,026	2·15	13	11,854	1·02
Other Countries .	52	40,897	—	38	44,444	—	36	42,686	—	65	54,719	—	65	78,893	—	68	86,163	—
World's Total .	848	677,182	—	562	591,536	—	542	608,235	—	635	622,805		561	645,603	—	503	580,826	—

* Figures refer to steam and sailing vessels of 100 gross tons and over totally lost, condemned, etc. The tonnage given is gross for steamers and net for sailing ships up to and including the returns for 1919; in subsequent returns the tonnage is gross for both steamers and sailing ships.

† Japanese sailing vessels not included.

LARGEST STEAMERS OF THE WORLD.

Gross Tonnage.	Name.	Speed (knots).	Built.	Flag.	Owners.	Registered Dimensions.* Length.	Breadth.	Depth.
						ft.	ft.	ft.
56,551	Majestic (*ex*-Bismarck)	26	1921	British	White Star	915·5	100·1	58·2
54,282	Leviathan (*ex*-Vaterland)	21	1914	United States	U.S. Shipping Board	907·6	100·3	58·2
52,706	Berengaria (*ex*-Imperator)	23	1912	British	Cunard	883·6	98·3	57·1
46,439	Olympic	23	1911	British	White Star	852·5	92·5	59·5
45,647	Aquitania	24	1914	British	Cunard	868·7	97·0	49·7
34,569	Paris	22	1921	French	Cie. Gén. Transatlantique	735·4	85·3	59·1
34,356	Homeric (*ex*-Columbus)	18½	1922	British	White Star	751·0	83·3	48·6
30,696	Mauretania	27	1907	British	Cunard	762·2	88·0	57·1
25,037	Empress of Scotland (*ex*-Kaiserin Auguste Victoria)	17½	1905	British	Canadian Pacific Steamships, Ltd.	677·5	77·3	50·2
25,000	Caracciolo	18	1921	Italian	Nav. Gen. Italiana	—	—	—
24,547	Belgenland	18½	1917	British	International Nav. Co., Ltd.	670·4	78·4	44·7
24,541	Adriatic	18	1906	British	White Star	709·2	75·5	52·6
24,149	Rotterdam	17	1908	Dutch	Nederl. Amerik Stoomv. Maats	650·5	77·4	43·5
23,884	Baltic	17	1904	British	White Star	709·2	75·6	52·6
23,788	George Washington	18	1908	United States	U.S. Shipping Board	699·1	78·2	50·1
23,666	France	24	1912	French	Cie. Gén. Transatlantique	689·2	75·6	48·5
22,000	Duilio	18½	1917	Italian	Nav. Gen. Italiana	601·4	75·9	50·1
21,848	Giulio Cesare	19	1921	Italian	,, ,, ,,	602·4	76·5	20·5
21,517	Empress of Canada	18	1922	British	Canadian Pacific Steamships, Ltd.	627·0	77·9	42·2
21,498	Empress of Australia (*ex*-Tirpitz)	17	1914	British	,, ,, ,,	589·8	75·2	41·5
21,144	America	17	1905	United States	U.S. Shipping Board	668·8	74·3	47·8
21,073	Cedric	17	1903	British	White Star	680·9	75·3	44·1
21,026	Celtic	17	1901	British	,, ,,	680·9	75·3	44·1
20,602	Minnesota	13	1904	United States	Atlantic Transport Co. Inc.	622·0	73·5	41·5
20,597	Cap Polonio	17	1914	German	Hamburg Sudamerikanische Damps. Ges.	637·7	72·3	39·5
20,200	Resolute (*ex*-William O'Swald)	16½	1914	United States	American Ship and Commerce Nav. Corp.	596·0	72·3	40·2

* The registered dimensions are measured as follows: Length from fore part of stem under bowsprit to aft side of bead of stern post; breadth is taken to outside of plating; depth from top of beam of tonnage deck to ceiling at midships. If there is no ceiling it is measured to the tank top. If there are more than two decks, the tonnage deck is the second deck, counting from below.

GENERAL PARTICULARS OF LARGE SHIPS OF VARIOUS NATIONALITIES.

Name of Ship	Aquitania.	Mauretania.	Olympic.	Leviathan (formerly Vaterland).	Berengaria (formerly Imperator).	Majestic. (formerly Bismarck)
Name of Builders	John Brown & Co., Ltd., Clydebank	Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne	Harland & Wolff, Ltd., Belfast	Blohm & Voss, Hamburg	Vulcan Co., Hamburg	Blohm & Voss, Hamburg.
Name of Owners or Managers	Cunard Co.	Cunard Co.	White Star Line	U.S. Shipping Board	Cunard Co.	White Star Line
Year when built	1914	1907	1911	1914	1912	1921
Length over all	901 ft. 6 ins.	790 ft.	883 ft.	950 ft.	905 ft.	956 ft.
Length between perpendiculars (or moulded)	865 ft.	760 ft.	850 ft.	—	880 ft.	912 ft.
Breadth	96 ft. 6 ins.	88 ft.	92 ft.	100 ft.	98 ft.	100 ft.
Depth (moulded)	64 ft. 6 ins.	60 ft. 6 ins.	64 ft. 3 ins.	63 ft.	62 ft.	64 ft.
Gross Tonnage	45,647	30,696	46,439	54,282	52,706	56,551
Draught	35 ft. 3¾ ins.	36 ft. 2¼ ins.	34 ft. 7 ins.	38 ft. 6 ins.	35 ft. 6 ins.	38 ft. 11¼ ins.
Displacement (tons)	51,700	41,590	—	63,100	57,000	64,000
Number of Passengers—						
First Class	597	602	817	672 †	700	1000
Second Class	614	430	510	535	600	545
Third Class	2000 (and 52 servants)	780	1216	2392 ‡	2690	2392
Machinery Makers	John Brown & Co., Ltd.	Wallsend Slipway and Engineering Co., Ltd.	Harland & Wolff, Ltd., Belfast	Blohm & Voss, Hamburg	Vulcan Co., Hamburg	Blohm & Voss, Hamburg
Type of Engines	Steam Turbines driving Four Screws	Steam Turbines driving Four Screws	Reciprocating with Turbine on Centre Shaft	Turbines	Steam Turbines driving Four Screws	Steam Turbines driving Four Screws
Number of Cranks	—	—	8	—	—	—
Diameters of Cylinders	—	—	Two 54 ins.; two 84 ins.; and four 97 ins.	—	—	—
Stroke of Pistons	—	—	75 ins.	—	—	—
Revolutions per Minute	180	200	Reciprocating engines, 77; Turbine, 165	180–190	185	180
Total Indicated or Shaft Horse-power	60,000	75,000	51,000	—	76,250	66,000
Number and Type of Boilers	21 Cylindrical (double ended)	25 Cylindrical (23 double-ended, 2 single-ended)	29 Cylindrical (24 double-ended, 5 single-ended)	46 Water Tube	46 Water Tube	48 Water Tube
Number of Furnaces	168 (now fitted for oil burning)	192 (now fitted for oil burning)	159 (now fitted for oil burning)	138	46 (oil-fired)	48 (oil-fired)
Steam Pressure (lb. per sq. in.)	195	195	215	235	235	260
Total Heating Surface (sq. ft.)	138,595	159,000	142,454	210,440	203,009	220,000
Total Grate Area (sq. ft.)	3541	4060	3428	3843	3763	4013
System of Draught	Howden's	Howden's	Natural	Howden's	Howden's	Forced
Speed on Service (knots)	24	25·5 *	23	21	23	23·5

* Note.—This figure is the mean speed attained for 27 consecutive runs across the North Atlantic in one year covering a total distance of 77,500 nautical miles. The highest mean speed from Queenstown to New York was 26·06 knots.
† 80 Berths for Servants and 110 Pullman Berths in addition.
‡ Including 1542 Fourth Class Passengers.

FASTEST STEAMERS OF THE WORLD.†

Speed (knots).	Name.	Gross Tonnage.	Date built.	Flag.	Owners.	L.* (ft.).	B.* (ft.).	D.* (ft.).
27	Mauretania	30,696	1907	British	Cunard	762·2	88·0	57·1
26	Majestic	56,551	1921	,,	White Star	915·5	100·1	58·2
25 and under 26.	Anglia	3,053	1920	,,	L. & N. W. Rly.	380·5	45·2	10·5
	Cambria	3,445	1921	,,	,,	380·6	45·2	17·2
	Hibernia	3,458	1920	,,	,,	380·6	45·2	17·2
	Paris	1,774	1913	,,	L. B. & S. C. Rly.	293·5	35·6	15·2
	Scotia	3,441	1921	,,	L. & N. W. Rly.	380·5	45·2	26·2
	Versailles	1,903	1919	French	Chemins de Fer de l'État Français and the L. B. & S. C. Rly.	300·6	34·6	21·4
24 and under 25.	Aquitania	45,647	1914	British	Cunard	868·7	97·0	49·7
	Jan Breydel	1,767	1909	Belgian	Belgian Government	348·0	40·0	23·2
	Newhaven	1,656	1911	French	Chemins de Fer de l'État Français and the L. B. & S. C. Rly.	292·0	34·6	22·1
	Rouen	1,656	1912	,,		292·0	34·6	22·1
	Pieter de Coninck	1,767	1910	Belgian	Belgian Government	348·0	40·0	23·2
	Princesse Elisabeth	1,747	1905	,,	,,	357·0	40·0	23·2
	Stad Antwerpen	1,384	1913	,,	,,	300·0	36·0	22·9
	Ville de Liege	1,384	1913	,,	,,	300·0	36·0	22·9
	France	23,666	1912	French	Cie. Gén. Transatlantique	689·2	75·6	48·5
	Munster	2,646	1897	British	City of Dublin Steam Packet Co.	360·0	41·5	27·3
23 & under 24.	Olympic	46,439	1911	,,	White Star	852·5	92·5	59·5
	Ulster	2,641	1896	,,	City of Dublin Steam Packet Co.	360·0	41·5	27·5
	Viking	1,957	1905	,,	Isle of Man St. Packet Co.	350·4	42·0	16·1
	Berengaria	52,706	1912	,,	Cunard	883·6	98·3	57·1
22 and under 23.	Biarritz	2,053	1915	,,	S. E. & C. Rly.	341·2	42·1	24·0
	Brighton	1,129	1903	,,	L. B. & S. C. Rly.	273·6	34·2	14·1
	Dieppe	1,228	1905	,,	,,	273·5	34·8	13·8
	Maid of Orleans	2,071	1918	,,	S. E. & C. Rly.	341·1	42·1	16·0
	Malines	2,969	1921	,,	Gt. Eastern Rly.	320·7	43·2	25·7
	Manxman	2,091	1904	,,	Isle of Man St. Packet Co.	334·0	43·1	17·3
	Mona's Isle	1,688	1905	,,	,,	311·2	40·1	15·8
	Snaefell	1,713	1906	,,	,,	315·0	39·6	15·7
	St. Andrew	2,495	1908	,,	Fishguard and Rosslare Railways and Harbours Co.	351·1	41·1	16·5
	St. David	2,457	1906	,,	,,	350·8	41·1	16·5
	St. George	2,571	1906	,,	Gt. Eastern Rly.	352·0	41·1	16·2
	St. Patrick	2,456	1906	,,	Fishguard and Rosslare Railways and Harbours Co.	350·8	41·1	16·5
	Wahine	4,436	1913	,,	Union S.S. Co. of New Zealand, Ltd.	375·0	52·2	25·6
	Paris	34,569	1921	French	Cie. Gén. Transatlantique	735·4	85·3	59·1
	Princesse Clementine	1,474	1896	Belgian	Belgian Government	341·3	37·8	14·2
	Prinses Juliana	2,908	1920	Dutch	Stoomv. Maats. "Zeeland"	350·4	42·7	23·9
	Oranje Nassau	2,885	1909	,,	,,	350·0	42·7	16·4
21 and under 22.	Antwerp	2,957	1920	British	Gt. Eastern Rly.	321·6	43·1	17·9
	Archangel	2,448	1910	,,	,,	330·8	48·2	17·8
	Arundel	1,068	1900	,,	L. B. & S. C. Rly.	269·1	34·1	14·1
	Bruges	2,949	1920	,,	Gt. Eastern Ry.	321·6	43·1	17·9
	Curraghmore	1,587	1919	,,	L. & N. W. Rly.	307·1	40·1	14·5
	Empress	1,695	1907	,,	S. E. & C. Rly.	311·3	40·1	15·8
	Empress of Asia	16,909	1913	,,	Canadian Pacific Steamships, Ltd.	570·1	68·2	42·0
	Empress of Russia	16,810	1913	,,	,,	570·2	68·2	42·0
	Engadine	1,676	1911	,,	S. E. & C. Rly.	316·0	41·1	15·8
	Invicta	1,680	1905	,,	,,	311·2	40·1	15·8
	King Orry	1,877	1913	,,	Isle of Man St. Packet Co.	300·0	43·1	15·9
	Princess Patricia	1,158	1902	,,	Canadian Pacific Rly. Co.	270·0	32·1	11·6
	Riviera	1,675	1911	,,	S. E. & C. Rly.	316·0	41·1	15·8
	St. Denis	2,435	1908	,,	Gt. Eastern Rly.	331·0	43·2	17·8
	Victoria	1,689	1907	,,	S. E. & C. Rly.	311·0	40·1	15·8
	La Lorraine	11,372	1900	French	Cie. Gén. Transatlantique	563·1	60·0	35·9

* Registered dimensions; see note on p. 474.

† The speeds used in compiling this table are as given by the owners.

FASTEST STEAMERS OF THE WORLD †—*continued.*

Speed (knots).	Name.	Gross Tonnage.	Date built.	Flag.	Owners.	L.* (ft.).	B.* (ft.).	D.* (ft.).
21 and under 22.	La Savoie	11,168	1900	French	Cie. Gén. Transatlantique	563·1	60·0	35·9
	Venezia	988	1906	Italian	D. Tripcovich	275·0	32·1	10·2
	Leviathan	54,282	1914	U.S.	U.S. Shipping Board	907·6	100·3	58·2
	Von Steuben	14,901	1901	,,	,,	637·1	66·3	39·3
20 and under 21.	Antrim	1,954	1904	British	Midland Rly.	330·9	42·2	17·2
	Arvonia	1,482	1897	,,	L. & N. W. Rly.	329·0	39·1	15·8
	Britannia	459	1896	,,	P. and A. Campbell, Ltd.	230·0	26·6	9·6
	Cambria	420	1895	,,	,,	225·0	26·1	9·4
	Devonia	520	1905	,,	,,	245·0	29·0	9·7
	Duke of Argyll	2,036	1909	,,	L. & N. W. Rly.	330·9	41·1	17·1
	Duke of Cumberland	2,036	1909	,,	,,	330·7	41·1	17·1
	Empress of France	18,388	1913	,,	Allan Line	571·4	72·4	41·7
	Greenore	1,488	1912	,,	L. & N. W. Rly.	306·0	40·7	14·5
	Londonderry	1,968	1904	,,	Midland Rly.	330·6	42·1	17·1
	Loongana	2,448	1904	,,	Union S.S. Co. of New Zealand, Ltd.	300·3	43·1	23·3
	Maori	3,488	1907	,,	,,	350·5	47·2	24·7
	Menevia	1,872	1902	,,	L. & N. W. Rly.	330·2	39·1	15·7
	Nairana	3,042	1917	,,	Tasmanian Steamers Pty., Ltd.	315·8	45·6	23·6
	Queen Alexandra	785	1912	,,	J. Williamson & Co.	270·3	32·1	11·0
	Rathmore	1,569	1908	,,	L. & N. W. Rly.	299·5	40·2	14 8
	Westward Ho	438	1894	,,	P. and A. Campbell, Ltd.	225·0	26·1	9·5
	Rapide	i,195	1895	Belgian	Belgian Government	300·0	38·0	13·6
	Charles Roux	4,104	1907	French	Cie. Gén. Transatlantique	385·5	45·6	26·1
	Lutetia	14,654	1913	,,	Cie. de Nav. Sud Atlantique	579·0	64·1	36·7
	Massilia	15,147	1916	,,	,,	574·0	64·0	40·2
	Prins Hendrik	1,968	1895	Dutch	Stoomv. Maats. "Zeeland"	320·0	35·8	16·0
	Città di Catania	3,397	1910	Italian	Italian Government	363·5	42·1	18·8
	Città di Siracusa	3,497	1910	,,	,,	363·5	42·1	18·5
	Esperia	11,346	1918	,,	Soc. Italiana di Servizi Marittimi	492·1	61·7	34·1
	Agamemnon	19,361	1902	U.S.	U.S. Shipping Board	684·3	72·3	40·2
	City of Detroit III.	6,061	1912	,,	Detroit and Cleveland Navigation Co.	455·8	55·5	22·5
	Mount Vernon	18,372	1906	,,	U.S. Shipping Board	685·4	72·2	40·5
	Midland	1,535	1895	,,	Norfolk and Washington Steamboat Co.	260·0	46·0	14·1
	Northland	2,055	1911	,,	,,	291·2	51·0	18·0
	Southland	2,081	1908	,,	,,	291·2	51·0	16·1
	Tacoma	836	1913	,,	J. Green	209·4	30·0	17·6

* Registered dimensions; see note on p. 474.

NUMBERS OF MERCHANT VESSELS OF VARIOUS SPEEDS.†

Speed.	Number. 1910.	1920.	1921.	1922.	Speed.	Number. 1910.	1920.	1921.	1922.
25 knots and over	—	1	1	8	16½ knots	45	45	45	44
24 ,, and under 25	—	9	10	9	16 ,,	126	120	124	131
23 ,, ,, 24	—	10	6	5	15½ ,,	47	42	35	35
22 ,, ,, 23	—	15	17	17	15 ,,	215	178	183	185
21 ,, ,, 22	—	20	21	20	14½ ,,	85	70	76	81
20 ,, ,, 21	105*	30	30	32	14 ,,	276	281	276	289
19 ,, ,, 20	42	27	26	26	13½ ,,	138	156	163	170
18½ knots	24	18	20	18	13 ,,	462	403	434	458
18 ,,	60	56	52	54	12½ ,,	206	166	148	153
17½ ,,	48	42	42	36	12 ,,	732	698	739	790
17 ,,	83	76	80	88					

* This figure includes all merchant steamers of 20 knots and over in existence in 1910.
† The speeds used in compiling these tables are as given by the owners.

PARTICULARS OF FASTEST VOYAGES ON PRINCIPAL PASSENGER SERVICES.

Name of vessel.	Owners.	Date of Voyage.	Ports between which Voyage was made.	Total distance (Sea miles).	Time taken.	Average speed (Knots).	Best day's run (Knots).	Remarks.
Mauretania . .	Cunard Steam Ship Co., Ltd.	Sept., 1910	Liverpool and New York	2,813½*	4 days, 10 hours, 41 mins.	26·4	—	* The distance given is between Daunts Rock and Ambrose Channel Light Vessel, the points between which the time was taken. On a voyage in January, 1911, the Mauretania attained a speed of 27·04 knots for one day, and the best day's run on the same voyage was 676 knots. Her record average speed for the whole voyage is 26·06 knots. For a short period the vessel has actually attained a speed of 28·5 knots. † Record sea transit to Bombay, but not record speed as vessel did not have to deviate to Marseilles. ‡ Now owned by Gt. Eastern Railway.
Majestic . . .	White Star Line	June, 1922	New York and Southampton *via* Cherbourg	3,139 (ocean passage)	5 days, 9 hours, 42 mins.	24·2	573	
Empress of France	Canadian Pacific Steamships, Ltd.	Aug. 25–31, 1920	Liverpool and Quebec	2,633	5 days, 20 hours, 6 mins.	18·8	484	
China	Peninsular and Oriental Steam Navigation Co.	Sept. 26 to Oct. 14, 1919	London and Bombay	6,258	17 days 20 hours.†	15·7	—	
Orcoma . . .	Pacific Steam Navigation Co.	June 30 to Sept. 16, 1921	Liverpool, Valparaiso, Liverpool, *via* Panama Canal	18,560	77 days, 10 hours.	14·2	381	
Paris	L.B. & S.C. Railway	July 14, 1913	Newhaven and Dieppe	65	2 hours, 35 mins., 37 secs.	25·07	—	
Maid of Orleans .	S.E. & C. Railway	April 25 & 28, 1922	Dover and Calais	20	50 mins.	24	—	
St. George . .	Gt. Western Railway ‡	July 6, 1910	Fishguard and Rosslare	54	2 hours, 28 mins.	21·9	—	
Lorina	L. & S.W. Railway	Sept. 4, 1920	Jersey and Southampton	130	6 hours, 34 mins.	19·8	—	

NUMBERS OF VESSELS CLASSED BY VARIOUS CLASSIFICATION SOCIETIES.*

Society.		1900.	1910.	1913.	1919.	1920.	1921.	1922.
Lloyd's Register		9290	10,302	10,466	9175	9924	10,154	10,361
British Corporation		477	675	876	1002	1021	1190	1341
American Bureau of Shipping	Record of American and Foreign Shipping	1284	1139	846	926	1581	2216	2565
	Gt. Lakes Register	—	609	572	442	393	392	382
Bureau Veritas		5122	4626	5165	5706	5666	6387	6521
Norske Veritas		2076	1560	1504	955	1034	1109	1217
Registro Italiano		1116	1263	1442	699	975	1280	1987
Germanischer Lloyd		1761	2672	2848	—	—	2219	—
Veritas Adriatico		1107	1041	1146	516	376	471	†

* Many vessels, of course, are not exclusively classed in one Register.
† The Veritas Adriatico is now amalgamated with the Registro Italiano.

PAY IN THE MERCHANT SERVICE.—Monthly Rates.

*Foreign-going Cargo Steamers.**

Rating.	1914.	1922.†
	£ s. £ s.	£ s. £ s.
First Mates	12 5 to 14 5	17 10 to 26 10
Second Mates	9 5 ,, 12 15	15 0 ,, 18 10
Third Mates	7 10 ,, 10 10	13 0 ,, 14 0
Chief Engineers	16 15 ,, 24 0	21 10 ,, 34 10
Second Engineers	12 5 ,, 14 15	17 10 ,, 26 10
Third Engineers	8 15 ,, 11 15	15 0 ,, 18 10
Carpenters	7 0 ,, 7 10	12 10 ,, 14 10
Boatswains	6 5 ,, 6 10	11 10 (Fixed rate.)
Firemen	5 10 ,, 6 0	10 10 ,,
Able Seamen	5 0 ,, 5 10	10 0 ,,

* On Oil-Tank Vessels, the 1922 rates are supplemented by the following percentage additions:—

Chief Engineers . . . . 12½ per cent.
First Mates and Second Engineers . . . . . . 10 ,,
Other Mates and Engineers . . . . 7½ ,,

On Motor Vessels there is a special National Standard Scale of Pay for Engineer Officers substantially higher than on steam-driven vessels.

† The 1922 figures are the National Maritime Board standard rates of pay, based, in the case of Navigating and Engineer Officers, on tonnage and seniority.

On Passenger Liners, Navigating and Engineer Officers, as a rule, receive now, as before the War, wages from 10 to 25 per cent. higher than the Standard Cargo Vessel rates.

NUMBER AND GROSS TONNAGE OF THE VESSELS OF 100 TONS GROSS AND UPWARDS (STEAM, SAIL, AND MOTOR) BELONGING TO EACH OF THE SEVERAL COUNTRIES OF THE WORLD, AS RECORDED IN LLOYD'S REGISTER.

Flag.	June, 1910.		June, 1913.		June, 1919.	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
British: U.K.	9,417	17,516,479	9,214	18,696,237	7,964	16,555,471
British: Brit. Dom.	2,078	1,495,815	2,073	1,735,306	2,141	2,052,404
British: Total	11,495	19,012,294	11,287	20,431,543	10,105	18,607,875
American: Sea	2,774	2,761,605	2,696	2,998,457	4,350	10,782,170
American: Lakes	606	2,256,619	627	2,382,690	506	2,257,786
American: Philippine Islands	89	40,454	77	46,489	73	51,817
American: Total	3,469	5,058,678	3,400	5,427,636	4,929	13,091,773
Argentine	267	163,421	308	214,835	215	154,441
Austro-Hungarian	369	779,029	427	1,011,414	339	714,617
Belgian	165	299,638	172	304,386	152	313,276
Brazilian	383	251,753	459	329,637	428	512,675
Chilian	139	151,218	131	139,792	114	101,647
Chinese	68	90,420	66	86,690	102	132,515
Cuban	60	59,445	59	61,536	51	47,295
Danish	863	736,562	811	762,054	645	702,436
Dutch	628	1,015,193	759	1,309,849	931	1,591,911
Esthonian	—	—	—	—	—	—
Finnish	—	—	—	—	338	180,962
French	1,465	1,882,280	1,552	2,201,164	1,440	2,233,631
German	2,178	4,333,186	2,321	5,082,061	1,768	3,503,380
Greek	408	527,581	442	722,782	312	323,796
Italian	1,080	1,320,653	1,114	1,521,942	858	1,370,097
Japanese	851	1,149,222	1,037	1,500,014	1,418	2,325,266
Latvian	—	—	—	—	—	—
Norwegian	2,065	2,014,533	2,191	2,457,890	1,629	1,857,829
Peruvian	57	31,587	60	45,514	63	79,342
Portuguese	190	110,183	208	120,579	227	261,212
Roumanian	23	31,973	33	45,408	35	63,792
Russian	1,241	887,325	1,216	974,178	618	541,005
Spanish	579	765,460	607	840,995	576	750,611
Swedish	1,472	918,079	1,436	1,047,270	1,263	992,611
Turkish	332	175,869	272	157,298	161	116,249
Uruguayan	54	63,412	65	75,531	43	44,499
Other Countries and flag not recorded	157	85,771	158	98,115	495	304,530
Total	30,058	41,914,765	30,591	46,970,113	29,255	50,919,273

NUMBER AND GROSS TONNAGE OF THE VESSELS OF 100 TONS GROSS AND UPWARDS (STEAM, SAIL, AND MOTOR) BELONGING TO EACH OF THE SEVERAL COUNTRIES OF THE WORLD, AS RECORDED IN LLOYD'S REGISTER—*continued.*

Flag.	June, 1920.		June, 1921.		June, 1922.	
	No.	Gross Tonnage.	No.	Gross Tonnage.	No.	Gross Tonnage.
British — U.K.	8,561	18,330,424	9,034	19,571,554	8,849	19,295,637
British — Brit. Dom.	2,270	2,252,228	2,399	2,499,244	2,472	2,746,883
British — Total	10,831	20,582,652	11,433	22,070,798	11,321	22,042,520
American — Sea	4,889	13,789,874	4,958	14,697,088	4,886	14,738,506
American — Lakes	492	2,207,429	494	2,254,930	495	2,247,690
American — Philippine Islands	76	51,986	99	73,984	99	76,264
American — Total	5,475	16,049,289	5,551	17,026,002	5,480	17,062,460
Argentine	198	150,023	209	167,154	216	181,555
Austro-Hungarian	—	—	—	—	—	—
Belgian	213	415,112	256	551,031	275	579,477
Brazilian	400	497,860	402	499,325	399	492,571
Chilian	112	103,788	124	113,447	126	131,401
Chinese	102	142,834	122	163,037	134	188,388
Cuban	53	53,439	59	58,553	65	62,677
Danish	745	803,411	798	964,464	822	1,038,138
Dutch	987	1,793,396	1,069	2,225,787	1,164	2,632,713
Esthonian	—	—	90	41,183	98	45,259
Finnish	312	166,689	330	198,352	352	213,671
French	1,758	3,245,194	2,044	3,652,249	2,094	3,845,792
German	1,138	672,671	1,255	717,450	1,723	1,887,408
Greek	405	530,261	362	599,929	379	668,127
Italian	1,115	2,242,393	1,271	2,650,573	1,413	2,866,335
Japanese	1,940	2,995,878	2,033	3,354,806	2,026	3,586,918
Latvian	—	—	99	53,342	67	40,124
Norwegian	1,777	2,219,388	1,889	2,584,058	1,852	2,600,861
Peruvian	69	88,962	68	87,167	74	101,209
Portuguese	249	275,665	284	296,847	286	285,878
Roumanian	39	74,540	37	73,973	31	72,297
Russian	613	534,547	465	412,459	—	—
Spanish	749	997,030	828	1,165,541	973	1,282,757
Swedish	1,297	1,072,925	1,353	1,160,211	1,345	1,115,375
Turkish	—	—	—	—	—	—
Uruguayan	47	63,837	54	85,886	53	76,311
Other Countries and flag not recorded	989	1,542,272	721	1,001,029	1,167	1,270,564
Total	31,595	57,314,065	33,206	61,974,653	33,935	64,370,786

TABLE SHOWING THE NUMBERS AND GROSS TONNAGES OF STEAMERS AND MOTOR VESSELS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1922.

Country.	Numbers of Vessels Owned of Various Gross Tonnages.										Total Number of Vessels owned.	Percentage of Total Number of Ships of 6000 gross tons and over.
	100 tons and under 500 tons.	500 tons and under 1000 tons.	1000 tons and under 2000 tons.	2000 tons and under 4000 tons.	4000 tons and under 6000 tons.	6000 tons and under 8000 tons.	8000 tons and under 10,000 tons.	10,000 tons and under 15,000 tons.	15,000 tons and under 20,000 tons.	20,000 tons and over.		
United Kingdom .	3,839	756	813	1,003	1,151	505	185	130	34	14	8,430	10·3
British Dominions	905	236	247	274	126	29	6	7	3	—	1,833	2·5
United States . .	631	212	239	1,375	941	666	98	60	7	5	4,234	19·8
Denmark . .	180	97	202	95	28	12	4	4	—	—	622	3·2
France	687	135	253	332	190	70	34	19	1	2	1,723	7·3
Germany . .	815	305	182	96	74	48	9	2	1	1	1,533	4·0
Holland . . .	387	92	189	184	108	100	29	7	3	1	1,100	12·7
Italy . . .	279	90	119	249	191	66	12	6	1	3	1,016	8·7
Japan	823	333	258	304	200	79	18	11	—	—	2,026	5·3
Norway . .	698	214	417	232	113	40	—	2	—	—	1,716	2·4
Spain	314	94	118	195	47	7	1	4	—	—	780	1·5
Sweden . . .	630	140	225	77	44	4	—	2	—	—	1,122	0·5
Other Countries .	1,437	458	513	455	203	37	16	1	—	—	3,120	1·7
Total for the whole World . . .	11,625	3,162	3,775	4,871	3,416	1,663	412	255	50	26	29,255	8·2

TABLE SHOWING THE NUMBERS AND AGES OF STEAMERS AND MOTOR VESSELS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1922.

Country.	Numbers of Vessels owned of Various Ages.						Total Number of Vessels owned.	Percentage of Total Number of Ships under 5 years old.
	Under 5 years.	5 years and under 10 years.	10 years and under 15 years.	15 years and under 20 years.	20 years and under 25 years.	25 years and over.		
United Kingdom .	1,927	1,535	1,186	1,291	942	1,549	8,430	23
British Dominions	302	224	333	277	199	498	1,833	16·5
United States . .	2,381	386	324	384	334	425	4,234	56·3
Denmark . . .	187	88	47	95	70	135	622	30
France	574	200	235	229	148	337	1,723	33·3
Germany . . .	484	204	203	210	139	293	1,533	31·5
Holland . . .	367	255	138	126	127	87	1,100	33·4
Italy	255	84	118	113	137	309	1,016	25
Japan	808	401	142	175	128	372	2,026	40
Norway . . .	465	297	248	222	141	343	1,716	27
Spain	221	48	45	38	64	364	780	28·4
Sweden . . .	189	150	93	106	118	466	1,122	16·8
Other Countries .	362	293	428	484	352	1,201	3,120	11·6
Total for the whole World . . .	8,522	4,165	3,540	3,750	2,899	6,379	29,255	29·2

FLUCTUATIONS IN THE PRICE OF A NEW, READY 7,500-TON CARGO STEAMER.

Period.	£.
1898 (Sept.)	48,500
1905 (June)	36,500
1908 (June)	**36,000**
1910 (Jan.)	39,000
1912 (Dec.)	58,000
1914 (June)	42,500
1914 (Dec.)	55,000
1915 (Jan.)	60,000
1915 (June)	82,500
1915 (Sept.)	93,500
1916 (Jan.)	125,000
1916 (June	180,000
1917 (Jan.)	187,500
1918 (Jan.)	165,000
1918 (June)	180,500
1919 (Jan.)	169,000
1920 (Jan.)	**232,000**
1920 (June)	180,000
1921 (Jan.)	105,000
1921 (June)	63,750
1922 (Jan.)	60,000
1922 (June)	62,000

Compiled from "Fairplay," July 6, 1922.

NOTE.—The highest and lowest prices are given in heavy type.

IMPORTANT DATES IN THE DEVELOPMENT OF MARINE PROPELLING MACHINERY.

—	Approximate Date of Introduction in the United Kingdom.			
	Merchant.		Naval.	
Compound engines	—	1860	—	1865
Triple-expansion engines	—	1880	—	1885
Quadruple-expansion engines	—	1890	Not fitted	—
Cylindrical boilers	—	1862	—	1869
Water-tube boilers	Cross-channel	1911	Destroyers	1893
	Ocean liners	1914	Battleships	1897
Direct turbines	Cross-channel	1901	Destroyers	1898
	Ocean liners	1905	Light cruisers	1904
			Battleships	1906
Combination engines and turbines	Intermediate liner	1908	(For cruising only)	1902
Geared turbines	Single-reduction	1911	Single-reduction	1913
	Double-reduction	1916	Not fitted	—
Electric propulsion	First attempts	1904	Not fitted	—
	Modern plant	1912	—	—
Oil fuel burning	First attempts	1870	Coal and oil—	
			Destroyers	1902
			Battleships	1904
	Modern plant	1892	Oil alone—	
			Destroyers	1910
			Battleships	1913
Heavy oil engines	First attempts	1904	Tender	1914
	Modern plant	1910	Submarines	1908

PROGRESS IN MARINE MACHINERY—ATLANTIC LINERS.

	1881.	1888.	1893.	1899.	1907.	1914.	1921.
Ship Dimensions—							
Length	500′ 0″	528′ 0″	600′ 0″	685′ 0″	760′ 0″	865′ 0″	912′ 0″
Beam	50′ 0″	63′ 0″	65′ 0″	68′ 5″	87′ 6″	96′ 6″	100′ 0″
Perfomance—							
Speed in Knots	18·0	20·1	22·0	20·7	26·0	23·5	23·5
Horse Power	10,680	18,500	30,000	27,000	72,500	60,000	66,000
Engines—							
No. of Propellers	One	Two	Two	Two	Four	Four	Four
Type of Machinery	Vertical Compound	Vertical Triple Expansion	Vertical Triple Expansion	Vertical Triple Expansion	Steam Turbines	Steam Turbines	Steam Turbines.
Cylinders on each shaft	68″, 100″, 100″ by 72″ stroke	45″, 71″, 113″ by 60″ stroke	37″, 37″, 79″, 98″, 98″ by 69″ stroke	47½″, 79″, 93″, 93″ by 72″ stroke	— —	— —	— —
Revolutions of Propeller	64·2	86	81	78	180	180	180
Piston Speed (f.p.m.)	770	860	930	936	—	—	—
Referred M.P. (lb. per sq. in.)	29·1	35·3	35	35	—	—	—
Boilers—							
No. and type	— Cylindrical	9 double-ended Cylindrical	12 double-ended Cylindrical	15 double-ended Cylindrical	23 double-ended & 2 single-ended Cylindrical	21 double-ended Cylindrical	48 Water-tube (oil-fired)
Working-pressure (lb. per sq. in.)	100	150	165	192	195	195	260
System of Draught	Natural Draught	Closed Stokehold	Natural Draught	Assisted Draught	Howden's	Howden's	Forced
Heating Surface per H.P.	3·3 sq. ft.	2·75 sq. ft.	2·73 sq. ft.	2·77 sq. ft.	2·19 sq. ft.	2·31 sq. ft.	3·33 sq. ft.
H.P. per sq. ft. of grate	8·57	14·3	11·4	13·75	17·9	16·9	16·4
Total Weight of Machinery "Steam up"	1860 tons	2516 tons	4935 tons	4414 tons	9936 tons	9302 tons	—
H.P. per ton of Machinery	5·74	7·4	6·1	6·1	7·3	6·5	—
Coal Consumption per H.P. hour	—	1·7 lbs.	1·6 lbs.	—	1·4 lbs.	1·3 lbs.	—

PROGRESS IN MARINE MACHINERY—INTERMEDIATE OCEAN LINERS.*

Year	1880.	1892.	1911.	1914.	1920.
Ship dimensions—					
Length	400 ft.	470 ft.	520 ft.	550 ft.	550 ft.
Beam	45 ft.	53 ft.	64 ft.	66 ft. 6 in.	66 ft.
Performance—					
Speed in knots	12·5	12·5	14·5	16·5	17
Horse-power	3,000 I.H.P.	3,500 I.H.P.	7,500 I.H.P.	11,000 S.H.P.	11,000 S.H.P.
Engines—					
No. of propellers	One	Two	Two	Two	Two
Type of machinery	Vertical compound	Vertical triple-expansion	Vertical quadruple expansion	Geared steam turbines	Geared steam turbines
Dimensions of cylinders	52-in., 96-in. by 66-in.	22½-in., 36½-in., 60-in. by 48-in.	26-in., 37-in., 53-in., 76-in. by 54-in.	Two H.P. and two L.P. turbines with single-reduction-gearing	Two H.P. and two L.P. turbines with double-reduction-gearing
Propeller (revs. per min.)	61	80	82	133	85
Piston speed (feet per min.)	671	640	738	Turbine revs. 1,650	H.P. turbine, revs. 3,200; L.P. turbine, revs. 2,000
Referred mean pressure	20·5	32·0	37	—	—
Condenser surface per H.P.	1·85	1·6	0·84	0·80	0·62
Boilers—					
No. and type	Two cylindrical	Two D.E. and one S.E. cylindrical	Five double-ended cylindrical	Five double-ended cylindrical	Five water-tube boilers, burning oil fuel (with superheaters)
Working pressure (lb. per sq. in.)	90	170	210	210	250
System of draught	Natural	Natural	Natural	Howden's forced draught	Oil-burning with forced draught
Heating surface per H.P.	3·1 sq. ft.	3·3 sq. ft.	3·25 sq. ft.	2·5 sq. ft.	2·25 sq. ft.
H.P. per sq. feet of grate	7·6	10·0	11·75	17·5	—
Total weight of machinery "Steam up"	685 tons	795 tons	1,750 tons	1,800 tons	1,210 tons
H.P. per ton of machinery	4·35	4·4	4·25	6·1	9·1
Coal consumption per H.P. hour	2·375 lb.	1·875 lb.	1·55 lb.	1·4 lb.	0·875 lb. (Oil).

* This and the two succeeding tables are from "Two Centuries of Shipbuilding by the Scotts at Greenock" (1920).

PROGRESS IN MARINE MACHINERY—CARGO STEAMERS.

Year	1877.	1885.	1911.	1914.	1920.
Ship dimensions—					
Length	314 ft.	320 ft.	440 ft.	450 ft.	503 ft.
Beam	35 ft.	38 ft.	52 ft. 6 in.	56 ft.	63 ft.
Performance—					
Speed in knots	11·25	12·25	13·25	14·25	14·25
Horse-power	775 I.H.P.	1,650 I.H.P.	4,200 I.H.P.	4,000–5,000 S.H.P.	7,000 S.H.P.
Engines—					
No. of propellers	One	One	One	One	Two
Type of machinery	Tandem compound with flywheel	Triple-expansion	Triple-expansion	Steam turbines and single-reduction gearing; one H.P. and one L.P. turbine	Steam turbines and double-reduction gearing; two H.P. and two L.P. turbines
Propeller (revs. per min.)	52	70	73	102	80
Piston speed (feet per min.)	450	560	750	1,350 revs. of turbines	H.P. turbines, 3,500 revs.; L.P. turbines, 2,500 revs.
Referred mean pressure	23	31·5	35	—	—
Condenser surface per H.P.	2·17	1·83	1·5	1·18	1·12
Boilers—					
No. and type	One-Oval ends and round middle portion	Two cylindrical	Two main cylindrical	Two cylindrical	Three cylindrical oil-fired boilers with superheaters
Working pressure (lb. per sq. in.)	70	150	190	195	200
System of draught	Natural	Natural	Forced draught	Howden's forced draught	Oil burning with forced draught
Heating surface per H.P. (sq. ft.)	4·46	2·82	2·8	2·30	2·25
H.P. per sq. ft. of grate	7·6	10·4	16·25	20·0	—
Weights—					
Weight of machinery	200	340	900	930	1,100
H.P. per ton of machinery	3·87	4·85	4·67	6·45	6·35
Coal consumption per H.P. hour	About 2·5 lb.	1·95 lb.	1·65 lb.	1·45 lb.	0·85 lb. (Oil).

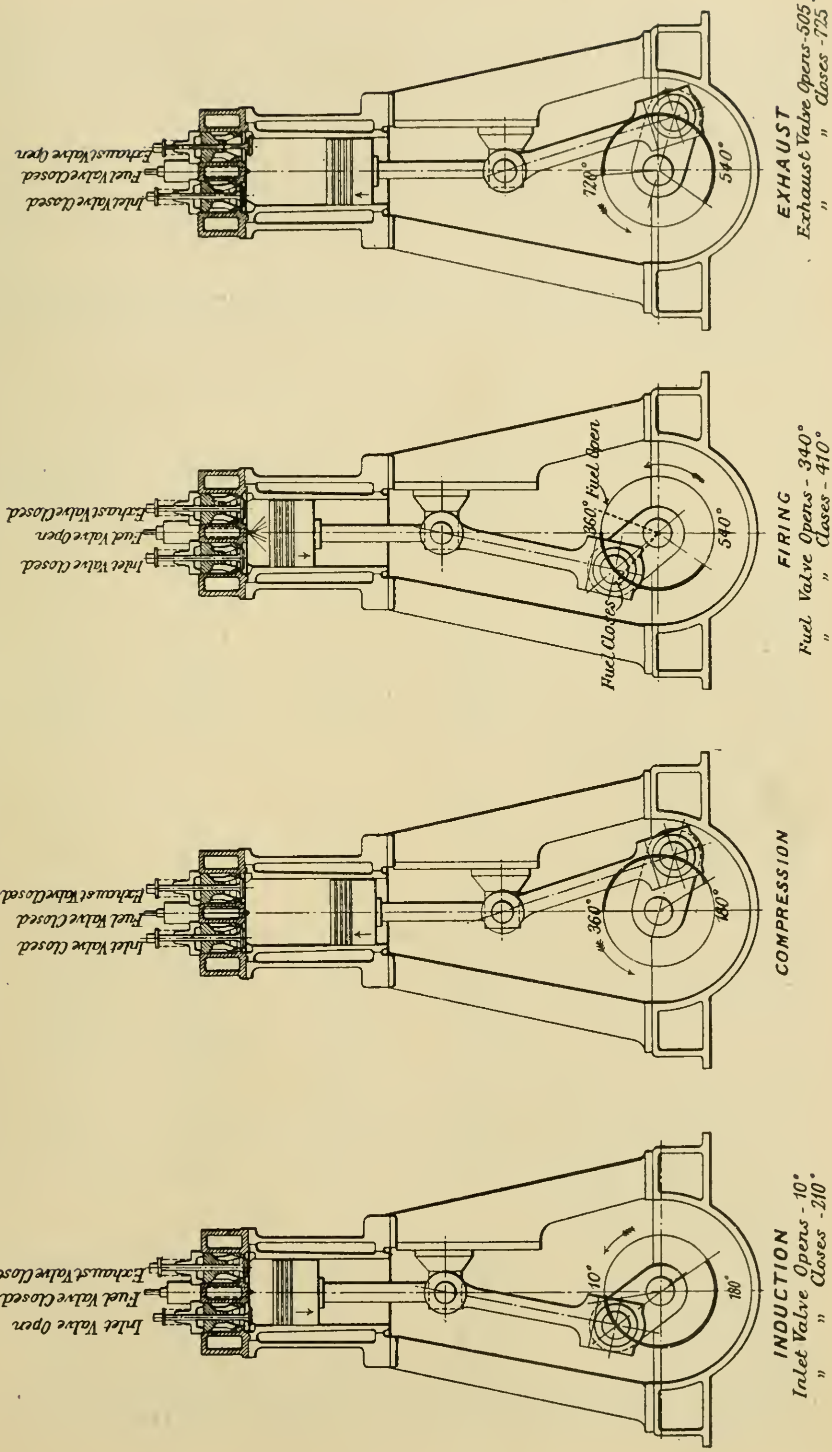
PROGRESS IN MARINE MACHINERY—CROSS-CHANNEL STEAMERS.

Year	1890.	1898.	1904.	1910.	1920.
Ship dimensions—					
Length	300 ft.	315 ft.	330 ft.	316 ft.	302 ft.
Beam	34 ft. 6 in.	37 ft.	42 ft.	41 ft.	35 ft. 6 in.
Performance—					
Speed in knots	18	19·75	19·5	21·5	23·5
Horse-power	4,400 I.H.P.	5,520 I.H.P.	5,500 S.H.P.	8,500 S.H.P.	12,300 S.H.P.
Engines—					
No. of propellers	Two	Two	Three	Three	Two
Type of machinery	Three-cylinder triple-expansion	Four-cylinder triple-expansion	Direct steam turbines, one H.P. and two L.P.	Direct steam turbines, one H.P. and two L.P.	Geared steam turbines, two H.P. and two L.P.
Propeller (revs. per min.)	130	165	550	625	435
Piston speed (feet per min.)	780	910	Turbines, 550 revs.	Turbines, 625 revs.	H.P. turbine, 2,600 revs.; L.P. turbine, 1,800 revs.
Referred mean pressure	30·75	43·0	—	—	—
Condenser surface per H.P.	1·42	1·4	1·35	0·75	0·6
Boilers—					
No. and type	Five S.E. cylindrical	Four S.E. cylindrical	Two D.E. and one S.E. cylindrical	Seven water-tube	Eight water-tube
Working pressure (lb. per sq. in.)	160	180	150	190	195
System of draught	Natural	Forced	Forced	Forced	Forced
Heating surface per H.P. (sq.ft.)	2·6	1·95	1·9	1·95	2
H.P. per sq. ft. of grate	12·25	17·5	16·5	15·0	22·0
Total weight of machinery—					
Steam up	590 tons	610 tons	590 tons	735 tons	1,055 tons
H.P. per ton of machinery	7·45	9·62	9·3	11·6	11·65
Coal consumption per H.P. hour	2·25 lb.	2·1 lb.	1·8 lb.	1·7 lb.	1·50 lb.

PROGRESS IN MARINE MACHINERY—MOTOR SHIPS.

	1909.	1910.	1912.	1914.	1916.	1922.
Ship Dimensions—						
Length	210 ft.	260 ft.	380 ft.	425 ft.	450 ft.	502 ft.
Beam	38 ft.	43 ft.	53 ft.	55 ft.	57 ft.	62 ft.
Performance—						
Speed	$8\frac{1}{2}$ knots	$10\frac{1}{2}$ knots	11 knots	$11\frac{1}{4}$ knots	12 knots	$13\frac{1}{2}$ knots
Indicated horse-power	490	1,460	2,500	3,100	4,000	6,400
Engines—						
No. of propellers	1	1	2	2	2	2
Type of engine	4-cycle single acting	4-cycle single acting	4-cycle single acting	4-cycle single acting	4-cycle single acting	4-cycle single acting
Cylinders per shaft	6	6	8	6	6	8
Bore	$15\frac{3}{4}$ in.	22 in.	$20\frac{7}{8}$ in.	$24\frac{7}{8}$ in.	$29\frac{1}{8}$ in.	$29\frac{1}{8}$ in.
Stroke	$23\frac{5}{8}$ in.	$39\frac{3}{8}$ in.	$28\frac{3}{4}$ in.	$37\frac{7}{8}$ in.	$43\frac{5}{16}$ in.	$45\frac{1}{4}$ in.
Revolutions per minute	140	125	140	125	100	115
Piston speed in feet per minute	550	820	670	785	725	865
Mean pressure, lbs. per square inch—						
I.H.P. basis	99	111	89·8	89·5	91	91·5
B.H.P. basis	75	83	68	67	68	69
Type of Auxiliaries	Steam	Steam	Electric	Electric	Electric	Electric
Total weight of machinery	91 tons	220 tons	390 tons	475 tons	600 tons	940 tons
B.H.P. per ton of machinery	4·3	5	4·8	4·9	5	5·1
Oil consumption for all purposes per B.H.P.-hour	0·6 lb.	0·5 lb.	0·47 lb.	0·45 lb.	0·45 lb.	0·45 lb.

MARINE DIESEL ENGINE, FOUR-CYCLE TYPE, DIAGRAM OF OPERATIONS.



COMPARISONS OF STEAM AND OIL-ENGINED VESSELS.

The table given herewith of comparisons of the cost of operating steam and oil-engined vessels is of the same form as was given in last year's issue of "Brassey's Annual," page 443, but with the figures amended to come more into line with present-day prices. With the reductions that have taken place in the prices of fuels, the lesser cost of operating all types of ships will be noted.

The savings consequent upon the installation of Diesel machinery still, however, compel attention. The relative positions occupied by vessels propelled by the various types of prime movers remain substantially the same.

It is impossible in any such comparisons to take fully into account all the factors which may operate in the case of vessels trading on different routes, but it is hoped that the figures given herewith will indicate the nature and the order of the relative costs.

The following savings, which are effected by the installation of Diesel machinery, have not been taken into account: less fuelling costs, demurrage, no stand-by losses, less cleaning ship, higher average speed in a seaway, reduced fuelling appliances required, etc.

	Diesel Engines.	Reciprocating Steam-Engines.		Turbines.
Type of propelling machinery.	4-cycle single-acting reversible, crosshead. Diesel electric-driven auxiliaries.	Triple-expansion engines, cylindrical boilers, Howden's forced draught, Superheat 50° Fahr.		With reduction gearing, oil fired, Superheat, 150° Fahr.
		Coal-Fired Boilers.	*Oil-Fired Boilers.*	
Total deadweight in tons	10,050	10,230	10,235	10,235
Freight-earning cargo in tons	9,357	7,880	8,555	8,743
Average sea-power, horse-power	2,500 (Shaft)	2,800 (Indicated)	2,800 (Indicated)	2,500 (Shaft)
Radius of action in miles	10,500	10,500	10,500	10,500
Fuel consumption per brake horse-power hour, including auxiliaries, in lb.	0·45	2·0	1·4	1·1
* Fuel consumption per day in tons	12·1	53·5	37·5	29·5
Fuel consumption per voyage of 16 days, in tons	194	856	600	472
Comparative Costs of Working.				
Provisions, total per month	£151	£184 15*s.* 0*d.*	£156 10*s.* 0*d.*	£156 10*s.* 0*d.*
Wages, total per month	£404	£468	£408	£408
Fuel, per 16 days' sailing	£776 (£4 0*s.* 0*d.* per ton)	£1,070 (£1 5*s.* 0*d.* per ton)	£1,800 (£3 0*s.* 0*d.* per ton)	£1,416 (£3 0*s.* 0*d.* per ton)
Fuel, per month of 24 days' sailing	£1,164	£1,605	£2,700	£2,124
Cost of running for one year of 288 days' sailing	£20,628	£27,096	£39,168	£32,265
Tons of freight-earning cargo carried, assuming 9 round voyages per year, each of 32 days' total sailing out and home	168,426	141,840	153,990	157,274
Cost per ton of cargo carried per 16 days' sailing out and home	2*s.* 5*d.*	3*s.* 10*d.*	5*s.* 1*d.*	4*s.* 1*d.*
Cost per ton-mile	·0076*d.*	·0114*d.*	·0152*d.*	·0121*d.*

* Calorific value of oil fuel taken at 19,000 B.Th.U.'s. Calorific value of coal taken at 13,500 B.Th.U.'s.

Note.—No cognizance has been taken in the above table of the fact that with Diesel ships, bunker fuel oil, costing £3 per ton, can be used; see page 241 of this issue.

LIST OF IMPORTANT DIESEL SHIPS IN SERVICE AND BUILDING, GIVING PARTICULARS OF THEIR MACHINERY.*

Date.	Name of vessel.	Makers of machinery.	Type of engine.	Cycle.	I.H.P. of engine.	B.H.P. of engine.	No. of cyl.	B.H.P. per cyl.	Diameter or cyl. in in.	Stroke ins.	Ratio stroke to bore.	Revs. per min.	Piston speed. Ft. per min.	M.E.P. on B.H.P. basis.	M.I.P. on I.H.P. Basis.	Consumption of fuel lbs. per sq. in. piston area per hour
1912†	Juno	Werkspoor	Werkspoor	4 single act.	1 460	1,100	6	183	$21\frac{1}{8}$	$39\frac{3}{8}$	1·87	125	820	84·0	111·0	0·219
1919†	Glenapp	Harland & Wolff	Burmeister and Wain	4 single act.	3,200	2,625	8	328	$29\frac{1}{2}$	$43\frac{5}{16}$	1·46	115	830	76·0	93·0	0·202
1920†	Afrika	Burmeister & Wain	Burmeister and Wain	4 single act.	2,250	1,700	6	283	$29\frac{1}{8}$	$45\frac{1}{8}$	1·55	115	865	65·0	86·0	0·179
1920†	Glenogle	Harland & Wolff	Burmeister and Wain	4 single act.	3,200	2,625	8	328	$29\frac{1}{8}$	$45\frac{1}{8}$	1·55	115	865	75·0	91·5	0·206
1920†	Cubore	Bethlehem Steel Co.	Bethlehem	2 single act.	3,900	2,700	6	450	$25\frac{1}{2}$	48	1·87	100	800	73·0	105·0	0·39
1920†	Ansaldo San Giorgio III	Ansaldo San Giorgio	Ansaldo	2 single act.	1,600	1,200	4	300	$24\frac{13}{16}$	$35\frac{7}{16}$	1·43	110	650	63·0	84·0	0·272
1921†	Malia	Cammell Laird	Fullagar	2 opposed p.	660	500	4	125	14	20	1·43	110	367	73·5	97·0	0·179
1920†	Fritz	Blohm & Voss	M.A.N.	2 double act.	1,250	850	3	283	$18\frac{7}{8}$	28	1·48	110	515	65 0	93·5	0·223
1920	—	Swan Hunter & Wigham Richardson	Polar	2 single act.	1,500	1,130	6	188	18	37	2·06	115	710	69·0	92·0	0·325
1921	—	Gotaverken	Burmeister and Wain	4 single act.	1,600	1,200	6	200	25	51	2·04	95	865	67·0	89·5	0·171
1921†	Domala	N.B. Diesel Co.	N.B. Diesel	4 single act.	2,330	2,000	8	250	$26\frac{1}{2}$	47	1·77	96	750	79·5‡	92·0	0·191
1921†	Sardinia	Werkspoor	Werkspoor	4 single act.	2,140	2,600	6	266	$26\frac{3}{8}$	$47\frac{1}{4}$	1·79	100	788	82·0	110 0	0·204
1921†	Seminole	Vickers, Ltd.	Vickers	4 single act.	1,620	1,250	6	208	$24\frac{1}{2}$	39	1·59	118	767	76·0	99·0	0·185
1921†	Pinzon	Beardmore & Co.	Beardmore-Tosi	4 single act.	1,600	1,200	6	200	$24\frac{3}{8}$	$38\frac{3}{8}$	1·57	120	767	74·0	98·0	0·180
1921	—	Stephen & Sons	Sulzer	2 single act.	2,200	1,650	4	412	$26\frac{3}{4}$	$43\frac{5}{16}$	1·62	85	610	78·0	108·0	0·321
1921†	"Conde de Churruca"	Messrs. Armstrong Whitworth & Co., Ltd.	Sulzer	2 single act.	1,700	1,250	4	312	$23\frac{5}{8}$	37	1·56	100	615	76·0	103·0	0·314
1921	—	Cammell Laird	Fullagar	2 opposed p.	1,580	1,200	4	300	$18\frac{1}{2}$	25	1·35	115	480	77·0	101·0	0·248
1921†	Yngaren	Doxford	Doxford	2 opposed p.	3,000	2,700	4	675	$22\frac{13}{16}$	$45\frac{5}{8}$	2·0	77	585	93·0	103·0	0·362
1921	Suphenco	James Craig Engine Works, U.S.A.	Craig	4 single act.	2,240	1,850	6	308	30	48	1·6	105	840	68·5	82·0	0·183

* Reproduced from a paper on "Recent Progress in Large Diesel Engines for the Mercantile Marine," read at the Engineering Conference of the Institution of Civil Engineers July, 1921, by James Richardson, B.Sc., A.M. Inst. C.E.

† In operation at sea.

† No compressors on main engine.

LIST OF THE PRINCIPAL COMMERCIAL FUEL-OIL BUNKERING STATIONS ESTABLISHED THROUGHOUT THE WORLD.

Various publications, British and American, interested in oil or shipping matters furnish particulars from time to time of fuel oil bunkering stations, either by way of more or less comprehensive general lists or of announcements by oil distributing companies. Some of the more comprehensive lists, whilst valuable as showing the widespread provision of fuel oil supplies already made or contemplated, do not in all cases, however, distinguish between installations in actual operation and those under construction, or clearly indicate whether Government installations are the only ones existing at particular ports. In compiling the following list from many sources, our aim has been to specify the principal bunkering ports at which commercial oil installations are in operation, showing separately ports at which installations have been announced as proposed or under construction. Whilst absolute accuracy cannot be guaranteed, much care has been taken to eliminate errors.

Aalborg (Denmark)
Abadan (Persia)
Adelaide
Aden
Alexandria
Algiers
Amsterdam
Antilla
Antofagasta (Chili)
Antwerp
Aomori
Astoria
Avonmouth
Bahia Blanca (Argentine)
Balboa
Balik Pappan (Borneo)
Baltimore
Bangkok (Siam)
Barcelona
Barrow
Batavia
Baton Rouge (Louisiana)
Bayonne, N.J.
Beaumont (Texas)
Belfast
Bergen
Bermuda
Bilbao
Birkenhead
Bizerta (Tunis)
Boelbaai Ceram
Bombay
Bordeaux
Boston (U.S.A.)
Brixham
Brunswick
Buenos Aires
Calcutta
Callao
Campana
Canton
Cape Town
Ceuta
Charleston
Christiania
Cienfuegos (Cuba)
Colombo
Colon (Panama Canal)
Constantinople
Copenhagen
Cristobal
Curacao
Destrehan
Donges
Dublin
Dunkirk
Durban
Fall River (Mass.)
Foochow
Fort William (Ont.)
Fredericia
Fremantle
Galveston
Gemsah
Genoa
Glasgow
Gothenburg
Grangemouth
Halifax (Canada)
Hamburg
Hamilton (Ont.)
Hankow
Havana
Havre
Helsingfors (Finland)
Hong Kong
Honolulu
Hull
Hurghada
Iquique (Chili)
Itosaki
Jacksonville (Fla.)
Jarrow-on-Tyne
Karachi
Ketchikan
Kettle Point (R.I.)
La Guayra (Venezuela)
La Pallice
Las Palmas
Levis
Lisbon
Liverpool
London :
Thameshaven,
Purfleet, etc.
Macassar (Celebes)
Madras
Malmo
Malta
Manchester Ship Canal
Manila
Maracaibo (Venezuela)
Marseilles
Matanzas
Melbourne

Miri
Mombasa
Monopoli
Montevideo
Montreal
Nagasaki
Neuvitas
Newcastle-on-Tyne
New Orleans
New York
Nonai
Nordenham
Norfolk (Va.)
Nyborg
Odense (Denmark)
Oran
Palembang (Sumatra)
Palermo
Pangkalan-Berandan
Payta
Penang
Perim
Pernambuco
Philadelphia
Piræus
Pisagua
Plymouth
Point Wells
Ponce
Ponta Delgada
Portici
Portishead
Portland (Ore)
Port Said
Port Sudan
Prince Rupert (British Columbia)
Puerto Mexico
Pulo Bukom
Puloe Samboe
Quebec
Rangoon
Rio de Janeiro
Rotterdam
Rouen
Sabine
Sabang
Saigon (French Cochin China)
Saitozaki
St. Georges
St. John (N.B.)
St. Nazaire
St. Thomas
Salina Cruz (Mexico)
San Diego
San Francisco
San Juan (Porto Rica)
San Pedro (California)
Santos (Brazil)
Sarnia
Savona
Seattle (Wash.)
Shanghai
Singapore
Soerabaya (Java)
Southampton
South Shields
Stockholm
Suez
Sunderland
Svolvaer (Norway)
Swansea
Sydney
Tacoma
Talara (Peru)
Taltal (Chili)
Tampico (Mexico)
Tarakan (Borneo)
Tocopilla (Chili)
Toronto
Trieste
Trinidad
Tuxpam (Mexico)
Vado
Valparaiso
Vancouver
Venice
Vera Cruz (Mexico)
Victoria (B.C.)
Willbridge
Yokohama

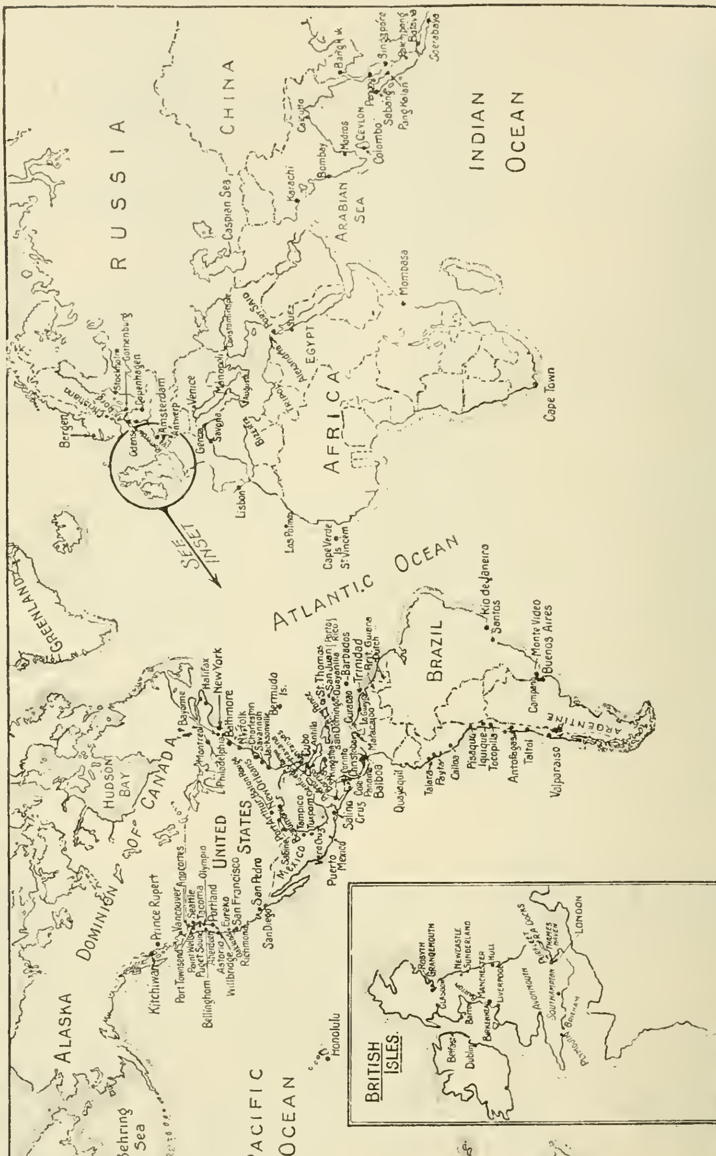
The following are some of the ports at which oil installations are reported to be under construction or contemplated :—

Cardiff
Gibraltar
Granton
Salonika
Wellington (N.Z.)

NUMBER AND TONNAGE OF MOTOR VESSELS (INCLUDING VESSELS FITTED WITH AUXILIARY MOTORS) OWNED BY VARIOUS NATIONS.

	June, 1920.		June, 1921.		June, 1922.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
United Kingdom .	130	136,807	180	263,128	214	355,461
British Dominions .	96	53,413	104	50,104	99	36,973
United States . .	159	183,448	173	188,125	147	188,283
Denmark	93	116,874	96	150,202	104	165,810
Holland	104	52,963	89	50,262	95	75,684
France	48	37,675	68	43,235	65	33,656
Germany	33	5,252	69	16,688	99	73,127
Italy	46	49,233	65	64,791	91	88,330
Japan	5	3,779	7	6,654	8	6,090
Norway	211	146,771	233	157,313	240	197,973
Russia	16	3,515	15	8,511	—	—
Spain	20	5,919	34	14,522	47	18,104
Sweden	124	98,623	167	137,329	160	166,679
Other countries . .	88	43,888	152	96,357	224	134,293
World's total . .	1,173	938,160	1,452	1,247,221	1,593	1,540,463

MAP OF THE WORLD, SHOWING PRINCIPAL PORTS WHERE OIL STORAGE IS PROVIDED.



(Reprinted from "The Motor Ship.")

PRODUCTION OF CRUDE OIL IN VARIOUS REGIONS.

Country.	Crude production of Petroleum in— 1870.	1880.	1890.	1900.	1910.	1913.	1919.	1920.	1921.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
NORTH AMERICA:									
Atlantic Seaboard	730,000	3,550,000	6,170,000	7,940,000	16,750,000	18,170,000	34,770,000	42,890.000	65,251,000 (Atlantic and Pacific Seaboard)
Pacific Seaboard	—	10,000	50,000	670,000	11,230,000	15,040,000	15,630,000	16,260,000	
MEXICO	—	—	—	—	540,000	3,840,000	13,000,000	24,330,000	29,114,000
TRINIDAD	—	—	—	—	20,000	70,000	260,000	300,000	343,000
SOUTH AMERICA:									
Atlantic Seaboard	—	—	—	—	—	20,000	210,000	280,000	373,000 (Atlantic and Pacific Seaboard)
Pacific Seaboard	—	—	—	40,000	180,000	280,000	350,000	370,000	
ASIA:									
India, East Indies, Persia, Japan, etc.	—	—	30,000	570,000	2,610,000	3,100,000	4,760,000	5,160,000	5,729,000
AFRICA:									
Egypt	—	—	—	—	—	10,000	230,000	150,000	168,000
EUROPE:									
Russia	30,000	410,000	3,930,000	10,380,000	9,640,000	8,610,000	4,580,000	3,520,000	3,000,000
Roumania	10,000	20,000	50,000	230,000	1,310,000	1,870,000	920,000	1,030,000	2,200,000
Elsewhere	—	30,000	110,000	380,000	1,920,000	1,240,000	920,000	850,000	496,000
Total	770,000	4,020,000	10,340,000	20,210,000	44,200,000	52,250,000	75,630,000	95,140,000	106,674,000
Percentages of increase	—	425 over 1870	157·2 over 1880	95·3 over 1890	118 8 over 1900	18·2 over 1910.	44·9 over 1913	26 over 1919 or 117 over 1910	12 over 1920

NOTE.—The figures in the above table may be taken as approximately accurate, allowing for the more or less exact methods of various tabulators, *e.g.* in converting "barrels" to tons, etc. This is often done roughly by taking seven barrels to the ton without reference to the varying specific gravities of particular oils. The later figures for Russia, and in one or two other instances where authoritative returns are not published, have had to be partly estimated.

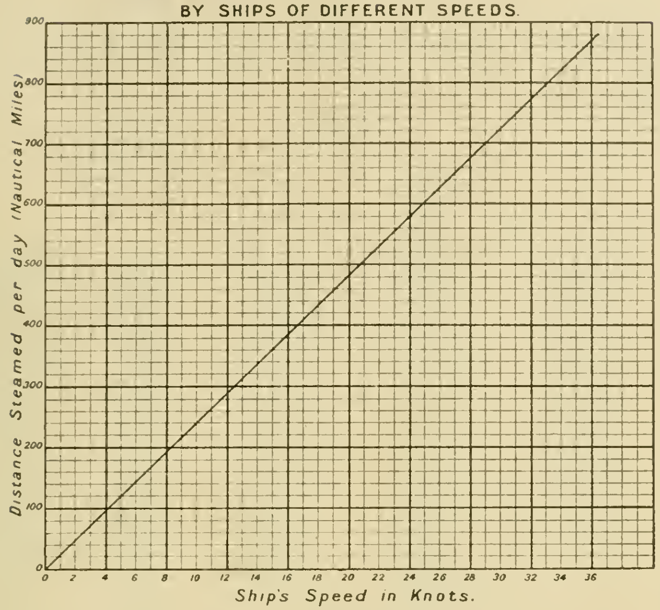
HIGHEST AND LOWEST IRON AND STEEL PRICES FOR THE YEARS 1914–1922.

—	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922 (to September).
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Marked Iron Bars, S. Staffs	9 0 0	13 0 0	15 10 0	15 10 0	20 0 0	25 10 0	33 10 0	33 10 0	16 0 0
	8 10 0	9 0 0	13 10 0		14 15 0	18 0 0	26 15 0	16 0 0	13 10 0
Common Iron Bars, Cleveland	8 2 6	13 2 6	15 0 0	15 0 0	20 0 0	23 0 0	30 0 0	27 10 0	13 0 0
	7 10 0	8 0 0	13 0 0	13 15 0	14 15 0	15 10 0	24 5 0	12 10 0	11 0 0
Steel Ship Plates, ⅜-in., Middlesbrough	7 10 0	11 0 0	14 5 0	13 10 0	16 10 0	22 0 0	24 10 0	24 0 0	10 10 0
	7 0 0	8 0 0	11 0 0	11 10 0	11 10 0	11 10 0	20 0 0	10 10 0	9 0 0
Steel Ship Angles, Middlesbrough	7 5 0	10 15 0	18 2 6	18 2 6	16 2 6	18 5 0	24 0 0	24 0 0	10 0 0
	6 15 0	7 15 0	10 15 0	11 2 6	11 2 6	11 2 6	19 10 0	10 0 0	8 15 0
Steel Ship Plates, Glasgow	7 5 0	11 17 6	13 15 0	14 15 0	16 10 0	23 15 0	28 5 0	25 10 0	10 10 0
	6 17 6	7 2 6	11 10 0	11 10 0	11 10 0	11 10 0	21 10 0	10 10 0	9 15 0
Steel Ship Angles, Glasgow	7 0 0	12 10 0	18 2 6	18 2 6	18 2 6	19 5 0	26 10 0	24 10 0	10 0 0
	6 7 6	7 0 0	11 2 6	11 2 6	11 2 6	11 2 6	19 10 0	11 0 0	8 10 0
Steel Boiler Plates, Middlesbrough	8 5 0	13 0 0	14 10 0	14 10 0	17 10 0	23 0 0	31 0 0	31 0 0	14 10 0
	8 0 0	8 5 0	12 10 0	12 10 0	12 10 0	12 10 0	23 0 0	14 10 0	12 10 0
Steel Boiler Plates, Glasgow	7 5 0	12 17 6	14 15 0	15 5 0	17 10 0	24 10 0	31 10 0	31 10 0	14 10 0
	7 0 0	7 2 6	12 10 0	12 10 0	12 10 0	12 10 0	24 0 0	14 0 0	12 10 0

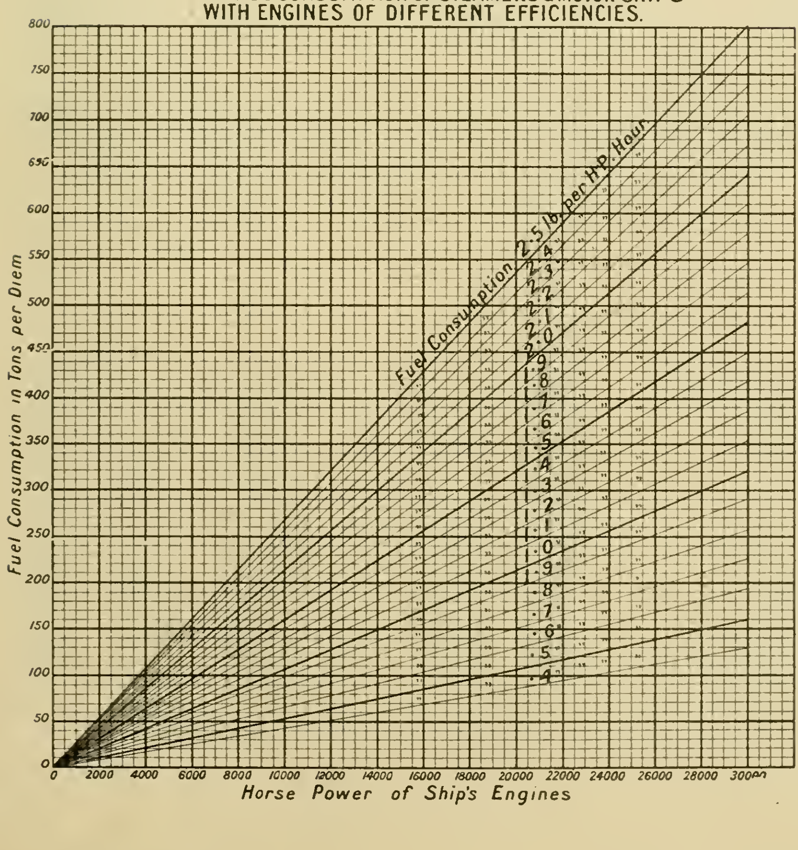
HIGHEST AND LOWEST FUEL OIL PRICES FOR THE YEARS 1914–1922.

—	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922 (to September).
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Heavy	3 2 0	5 6 0	8 0 0	11 5 0	8 10 0	6 10 0	13 0 0	8 0 0	3 15 0
	2 5 0	2 10 0	7 0 0	9 0 0			9 17 6	3 15 0	3 0 0
Light	3 10 0	5 19 0	9 0 0	16 10 0	9 10 0	7 10 0	15 0 0	11 0 0	5 5 0
	2 15 0	3 0 0	7 5 0	10 0 0			11 5 0	5 5 0	4 0 0

DIAGRAM SHOWING DISTANCE STEAMED IN ONE DAY BY SHIPS OF DIFFERENT SPEEDS.



DAILY FUEL CONSUMPTION OF STEAMERS & MOTOR SHIPS WITH ENGINES OF DIFFERENT EFFICIENCIES.



"EXPORTS" OF NEW SHIPS FROM THE UNITED KINGDOM.

Ships not Registered as British, with their Machinery.

Year.	War Vessels.	Steam Ships (other than War Vessels). Hulls and Fittings.	Steam Ships (other than War Vessels). Machinery.	Sailing Ships (other than War Vessels) including Boats.	Total of New Ships.
	£	£	£	£	£
1903	74,480	2,798,737	1,222,108	188,504	4,283,829
1904	388,600	2,570,835	1,164,779	330,937	4,455,151
1905	50,000	3,693,422	1,516,183	171,693	5,431,298
1906	2,800,000	3,973,873	1,668,592	201,706	8,644,171
1907	554,700	6,586,449	2,550,702	326,262	10,018,113
1908	1,879,994	5,902,428	2,505,280	189,773	10,567,475
1909	247,000	3,698,556	1,819,618	161,940	5,927,114
1910	4,894,500	2,553,427	1,209,119	113,158	8,770,204
1911	25,000	3,745,349	1,632,402	259,564	5,663,115
1912	765,000	4,243,308	1,750,351	268,503	7,027,162
1913	2,617,100	5,867,179	2,336,509	205,742	11,026,530
1914	308,385	4,716,226	1,784,900	123,043	6,932,554
1915	—	1,170,606	472,597	49,548	1,692,661
1916	20,000	754,372	481,703	34,510	1,290,585
1917	—	706,084	347,354	33.869	1,087,307
1918	—	778,525	229,292	39,517	1,047,334
1919	—	1,703,961	505,652	118,718	2,328,331
1920	—	26,280,243		295,771	26,576,016
1921	—	29,523,833		470,615	29,994,448
1922 (to Aug.)	—	22,294,325		176,767	22,471,092

STATEMENT SHOWING THE VALUE OF THE IMPORTS FOR HOME CONSUMPTION AND EXPORTS OF DOMESTIC PRODUCE OF THE PRINCIPAL COUNTRIES FOR THE YEARS 1913, 1920, AND 1921.

(Foreign currencies converted to sterling at par.)

Countries.	Imports. 1913.	Imports. 1920.*	Imports. 1921.	Exports. 1913.	Exports. 1920.*	Exports. 1921.
	Thousand £.	Thousand £.	Thousand £.	Thousand £	Thousand £.	Thousand £.
United Kingdom	652,692	1,709,896	979,635	524,532	1,334,469	703,196
United States	366,012	1,099,684	522,714	510,060	1,683,434	912,297
France	336,852	1,996,196	941,939	275,208	1,075,798	862,124
Netherlands	325,236	277,702	186,685	255,456	141,791	114,133
Belgium	185,460	511,301	402,057	145,380	347,702	285,593
Italy	145,824	559,857	538,181	100,464	239,406	211,267
Canada	135,648	274,812	164,337	89,664	261,602	164,999
British India	122,220	333,684	292,051	160,836	278,007	215,113
Switzerland	74,376	168,048	89,900	54,864	130,975	70,534
Japan	74,076	237,506	163,803	64,260	195,588	126,380
Brazil	67,164	125,005	60,468	65,448	107,521	58,587
Spain	52,248	55,862	50,430	42,300	40,429	31,934
Denmark	43,188	174,561	90,835	35,412	87,497	76,855
Union of South Africa	40,380	103,369	61,019	27,528	42,952	24,273
New Zealand	21,420	61,554	42,744	21,048	44,621	42,937

* The figures for 1920 have been revised since the Annual was published last year.

STATEMENT SHOWING THE ENTRANCES AND CLEARANCES IN THE FOREIGN TRADE OF THE UNDERMENTIONED COUNTRIES FOR THE YEARS 1913, 1920, AND 1921.

Note.—C = With Cargo only. C & B = With Cargo and in Ballast.

Countries.		Entrances.			Clearances.		
		1913.	1920.	1921.	1913.	1920.	1921.
		Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.	Thousand tons net.
United Kingdom	C	49,068	36,516	37,176	67,824	36,588	36,384
United States of America	C & B	53,280	64,128	62,184	53,796	67,824	62,592
France	C	34,512	28,788	27,300	26,112	16,944	21,624
Japan	C & B	24,720	26,136	27,984	24,900	26,592	27,888
Netherlands	C	17,148	8,700	12,204	11,016	6,324	9,876
Spain	C & B	25,788	15,816	20,028	28,992	12,984	15,984
British India	C	6,700	6,552	6,624	8,256	7,044	6,480
Australia	C & B	5,364	4,752	4,572	5,232	4,740	4,644
South Africa	C & B	5,352	4,080	4,200	5,280	4,128	4,176
Norway	C	3,756	2,856	2,232	4,740	3.396	3,480
Belgium	C	16,908	11,580	14,580	16,896	11,304	14,328
Sweden	C & B	13,764	11,508	8,124	17.004	11,640	8,100
Brazil	C & B	29,172	24,936	22,512	29,208	24,768	22,392

ABOVE AS PERCENTAGES OF 1913 FIGURES.

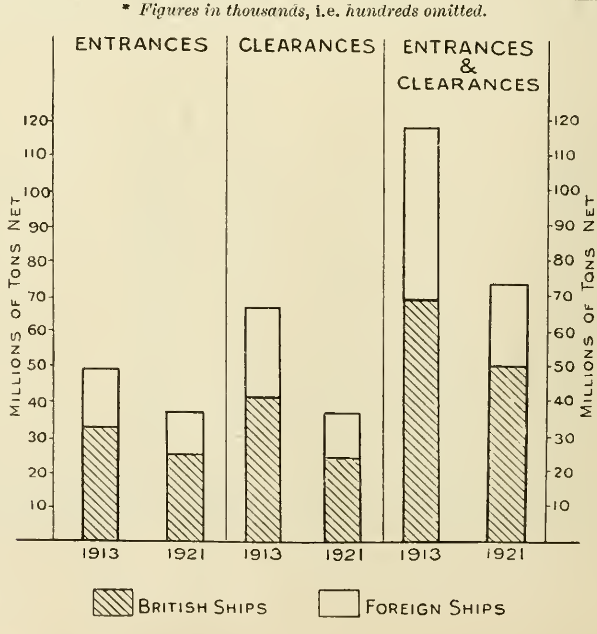
United Kingdom	100	74	76	100	54	54
United States of America	100	120	117	100	126	116
France	100	83	79	100	65	83
Japan	100	106	113	100	107	112
Netherlands	100	51	71	100	57	90
Spain	100	61	78	100	45	55
British India	100	97	98	100	85	78
Australia	100	89	85	100	91	89
South Africa	100	76	78	100	78	79
Norway	100	76	59	100	72	73
Belgium	100	68	86	100	67	85
Sweden	100	84	59	100	68	48
Brazil	100	85	77	100	85	77

STATEMENT SHOWING THE NATIONALITY AND NET TONNAGE OF VESSELS WHICH ENTERED AND CLEARED WITH CARGOES IN THE FOREIGN TRADE OF THE UNITED KINGDOM FOR THE YEARS 1913 AND 1921. (*See diagram below.*)

Nationality	Entrances.		Clearances.		Percentages			
					Entrances.		Clearances.	
	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.
	Tons.*	Tons.*	Tons.*	Tons.*				
British	32,291	25,118	40,102	24,280	65·8	67·7	59·1	66·7
Foreign:—								
Norwegian . . .	3,285	1,706	4,683	1,739	6·7	4·6	6·9	4·8
United States of America . . .	724	2,745	370	844	1·5	7·4	0·5	2·3
Swedish	1,891	852	3,016	837	3·9	2·3	4·5	2·3
Dutch . . .	1,702	1,956	2,536	2,057	3·5	5·3	3·7	5·6
Danish	1,161	874	2,613	1,136	2·4	2·4	3·9	3·1
French	999	1,021	1,975	1,629	2·0	2·8	2·9	4·5
Belgian	1,369	763	957	754	2·8	2·1	1·4	2·1
Japanese	140	430	282	417	0·3	1·1	0·4	1·2
Spanish	1,060	453	1,694	605	2·2	1·2	2·5	1·7
Italian	122	204	955	563	0·2	0·5	1·4	1·5
Russian	678	6	937	5	1·4	0·0	1·4	0·0
Greek	221	141	1,072	404	0·4	0·4	1·6	1·1
German	3,166	480	5,730	621	6·4	1·3	8·5	1·7
Austro-Hungarian .	128	—	715	—	0·3	—	1·0	—
Other Nationalities	125	363	185	504	0·2	0·9	0·3	1·4
Total Foreign .	16,772	11,994	27,719	12,115	34·2	32·3	40·9	33·3
Total British and Foreign . .	49,063	37,112	67,821	36,395	100·0	100·0	100·0	100·0

	Entrances and Clearances.		Percentages.	
	1913.	1921.	1913.	1921.
	Tons.*	Tons.*		
British	72,393	49,398	62	67
Foreign	44,490	24,109	38	33
Total . . .	116,883	73,507	100	100

* *Figures in thousands*, i.e. *hundreds omitted.*

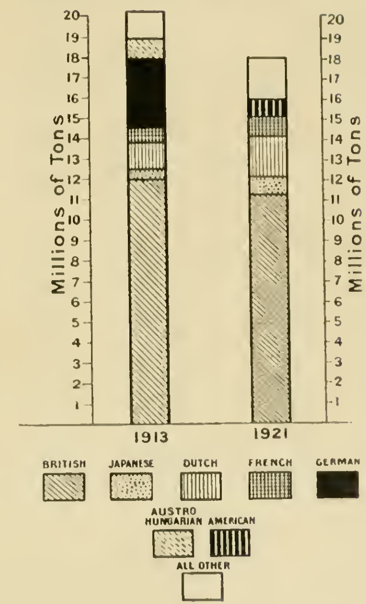


STATEMENT SHOWING THE NUMBER AND NET TONNAGE OF VESSELS THAT PASSED THROUGH THE SUEZ CANAL IN THE YEARS 1913 AND 1921, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

Nationality of Vessels.	Number of Passages.		Net Tonnage of Vessels.		Numbers as Percentages of Total.		Tonnages as Percentages of Total.	
	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.
British	2951	2418	12,052,484	11,397,019	58·0	60·8	60·2	62·9
Japanese . . .	68	227	343,732	1,042,266	1·3	5·7	1·7	5·8
Dutch . . .	342	459	1,287,354	2,031,625	6·7	11·6	6·4	11·2
French	256	211	927,787	967,746	5·0	5·3	4·6	5·3
Italian	110	245	290,576	934,146	2·2	6·2	1·5	5·2
Danish . . .	56	53	171,848	231,727	1·1	1·3	0·9	1·3
Norwegian . . .	44	63	93,313	258,848	0·9	1·6	0·5	1·4
American (U.S.) .	8	147	7,476	671,840	0·2	3·7	—	3·7
Swedish . . .	33	50	122,957	205,651	0·7	1·2	0·6	1·1
Greek	17	18	54,560	56,024	0·3	0·4	0·3	0·3
Spanish . . .	26	11	75,643	30,638	0·5	0·3	0·4	0·2
German . . .	778	35	3,352,287	170,520	15·3	0·9	16·7	0·9
Austria-Hungarian	246	—	845,830	—	4·8	—	4·2	—
Russian . . .	110	4	340,595	11,555	2·2	0·1	1·7	0·1
All others . . .	40	34	67.422	109,394	0·8	0·9	0·3	0·6
Total . .	5085	3975	20,033,802	18,118,999	100·0	100·0	100·0	100·0

NOTE.—The above figures include not only Merchant Vessels and Mail Steamers, but also Warship and Transports as well as Government Chartered Vessels.

NET TONNAGE AND NATIONALITIES OF VESSELS PASSED THROUGH SUEZ CANAL, 1913 AND 1921.



Statement showing the Number and Net Tonnage of Commercial Vessels that passed through the Panama Canal in the Years ended 30th June, 1916, 1917, 1918, 1919, 1920, 1921, and 1922, distinguishing the Principal Nationalities.

(Note.—Commercial Vessels include all Vessels except those of the United States Government, or chartered by the U.S. Government to carry Government supplies, and Vessels of less than 10 tons measurement).

Nationality.	Number of Vessels.							Net Tonnage of Vessels.						
	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1916.	1917.	1918.	1919.	1920.	1921.	1922.
British	358	780	702	607	753	972	935	1,161,097	2,663,250	2,529,203	1,915,744	2,760,188	3,978,329	3,795,526
American (U.S.A.)*	213	404	567	784	1,129	1,210	1095	652,989	1,239,492	1,704,040	2,257,342	3,791,088	4,861,761	4,971,509
Norwegian . . .	44	145	296	128	106	140	113	172,459	490,534	876,024	497,555	397,632	548,227	385,007
Japanese . . .	24	72	54	87	118	136	189	81,818	291,500	238,814	341,064	515,243	613,245	872,466
Chilian	33	99	96	93	79	63	53	91,243	265,210	254,841	253,561	212,000	159,727	150,398
Danish	18	43	100	79	9	60	53	68,011	163,882	272,946	213,534	32,221	236,512	227,473
Peruvian	30	86	83	64	75	60	60	74,429	218,593	208,958	166,956	191,689	157,495	161,930
Dutch	15	74	48	19	29	50	66	39,642	260,500	197,627	88,299	152,535	248,801	293,428
French . . .	1	9	52	104	60	44	51	4,343	38,889	147,805	253,774	114,664	155,889	190,171
Spanish	—	20	11	5	41	44	9	—	49,124	24,469	11,066	106,651	117,400	27,264
Other Nationalities	22	71	60	54	79	113	112	50,131	117,583	119,346	126,095	272,133	338,490	342,287
Totals . . .	758	1,803	2,069	2,024	2,478	2,892	2,736	2,396,162	5,798,557	6,574,073	6,124,990	8,546,044	11,415,876	11,417,459

Above as Percentages.

	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1916.	1917.	1918.	1919.	1920.	1921.	1915.
British	47·2	43·3	33·9	30·0	30·4	33·6	34·2	48·5	45·9	38·5	31·3	32·3	34·8	33·3
American (U.S.A.)*	28·1	22·4	27·4	38·7	45·6	41·8	40·0	27·2	21·4	25·9	36·8	44·4	42·6	43·5
Norwegian . . .	5·8	8·0	14·3	6·3	4·3	4·9	4·1	7·2	8·5	13·3	8·1	4·7	4·8	3·4
Japanese . . .	3·2	4·0	2·6	4·3	4·8	4·7	6·9	3·4	5·0	3·6	5·6	6·0	5·4	7·6
Chilian	4·3	5·5	4·7	4·6	3·2	2·2	2·0	3·8	4·6	3·9	4·1	2·5	1·4	1·3
Danish	2·4	2·4	4·8	3·9	0·3	2·1	2·0	2·8	2·8	4·2	3·5	0·4	2·1	2·0
Peruvian	4·0	4·8	4·0	3·2	3·0	2·1	2·2	3·1	3·8	3·2	2·7	2·2	1·4	1·4
Dutch . . .	2·0	4·1	2·3	0·9	1·2	1·7	2·4	1·7	4·5	3·0	1·4	1·8	2·2	2·6
French	0·1	0·5	2·5	5·1	2·4	1·5	1·8	0·2	0·7	2·2	4·2	1·3	1·4	1·7
Spanish	—	1·1	0·6	0·3	1·6	1·5	0·3	—	0·8	0·4	0·2	1·2	1·0	0·2
Other Nationalities	2·9	3·9	2·9	2·7	3·2	3·9	4·1	2·1	2·0	1·8	2·1	3·2	2·9	3·0
Totals . . .	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

* Includes Vessels engaged in the coasting trade of the U.S.A. which is carried on *entirely* by National Ships.

Statement showing (in tons weight) the Cargoes carried in Commercial Vessels that passed through the Panama Canal during the Years ended 30th June, 1916, 1917, 1918, 1919, 1920, 1921, and 1922, distinguishing the Principal Nationalities.

Nationality of Vessels.	Weight of Cargoes carried.						
	1916.	1917.	1918.	1919.	1920.	1921.	1922.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
British	1,570,660	3,393,750	2,615,675	1,876,939	2,830,268	3,738,257	3,329,861
American (U.S.A.)	848,857	1,475,725	2,098,277	2,758,886	4,547,140	5,163,025	4,950,519
Norwegian . . .	229,368	597,581	1,090,823	577,679	404,323	637,887	408,268
Japanese . . .	117,780	446,358	407,399	503,427	726,338	758,617	1,044,515
Chilian	53,573	184,446	153,259	161,340	104,738	61,737	46,182
Danish	94,950	242,567	420,063	325,277	42,533	322,059	272,779
Peruvian . . .	62,210	159,609	143,344	121,524	119,418	105,322	64,370
Dutch	61,959	314,203	233,063	119,297	128,442	216,488	290,573
French	7,176	36,680	159,859	286,812	125,249	132,836	139,463
Spanish . . .	—	71,080	35,394	10,047	101,563	143,076	23,701
Other Nationalities	47,581	136,564	174,875	175,393	244,487	319,910	314,679
Totals . . .	3,094,114	7,058,563	7,532,031	6,916,621	9,374,499	11,599,214	10,884,910

Above as Percentages.

	1916.	1917.	1918.	1919.	1920.	1921.	1922.
British	50·8	48·1	34·7	27·1	30·2	32·2	30·6
American (U.S.A.)	27·4	20·9	27·9	39·9	48·5	44·5	45·5
Norwegian . . .	7·4	8·5	14·5	8·4	4·3	5·5	3·7
Japanese . . .	3·8	6·3	5·4	7·3	7·7	6·5	9·6
Chilian	1·7	2 6	2·0	2·3	1·1	0·5	0·4
Danish	3·1	3·4	5·6	4·7	0·5	2·8	2·5
Peruvian . . .	2·0	2·3	1·9	1·8	1·3	0·9	0·6
Dutch	2·0	4·5	3·1	1·7	1·4	1·9	2·7
French	0·2	0·5	2·1	4·2	1·3	1·2	1·3
Spanish	—	1·0	0·5	0·1	1·1	1·2	0·2
Other Nationalities	1·6	1·9	2·3	2·5	2·6	2·8	2·9
Totals . . .	100·0	100·0	100·0	100·0	100·0	100·0	100·0

TRADE OF PRINCIPAL BRITISH COAL-SHIPPING CENTRES, 1913 & 1920.

	Coal Exports. Tons.		Other Exports. Tons.	
	1913.	1920.	1913.	1920.
Barry Docks and Penarth	20,095,051	9,424,243	121,370	46,000
Newcastle, North Shields, and South Shields	13,619,502	5,035,289	318,445	317,000
Blyth	4,475,827	1,381,714	10,323	—
Newport (Mon.)	4,841,786	2,872,286	234,200	93,000
Port Talbot, Briton Ferry, Neath Abbey, and Porthcawl	2,318,699	1,848,594	5,374	8,000
Sunderland	4,027,806	1,253,110	3,592	63,000
Swansea	4,451,597	3,016,175	471,968	319,000
Burntisland	1,952,030	132,836	465	6,000
Methil	2,594,157	514,994	1,223	—
Total Nine Centres	58 376,455	25,479,241	1,166,960	852,000
Total, United Kingdom	76,687,000	28,863,000	16,937,000	12,312,000

STATEMENT SHOWING (IN RESPECT OF THE NINE PRINCIPAL COAL-SHIPPING CENTRES OF THE UNITED KINGDOM) FOR THE YEARS 1913 AND 1920 IN COLUMN I. THE NUMBER AND NET TONNAGE OF VESSELS WHICH CLEARED WITH CARGOES TO BRITISH POSSESSIONS AND TO EACH OF THE PRINCIPAL FOREIGN COUNTRIES, AND IN COLUMN II. THE TOTAL NUMBER AND TONNAGE OF EACH FOREIGN COUNTRY'S SHIPS WHICH CLEARED FROM THOSE CENTRES TO FOREIGN PORTS.

Countries.	Column I. Countries to which Vessels departed.				Column II.. Total Clearances of National Ships from the 9 Centres.			
	No. of Vessels.		Net tonnage.		No. of Vessels.		Net tonnage.	
	1913.	1920.	1913.	1920.	1913.	1920.	1913.	1919.
Russia	1,405	24	1,421,049	25,081	422	99	427,832	57,651
Sweden	1,582	1,246	1,187,765	640,836	1,993	1,193	1,582,746	639,068
Norway	1,517	1,029	866,001	658,307	4,280	3,563	3,007,900	2,363,454
Denmark	1,365	808	938,065	456,715	1,802	1,075	1,448,549	732,479
Germany	3,009	26	2,774,073	17,842	2,087	22	2,181,319	11,861
Netherlands	691	269	479,126	178,604	609	493	557,051	330,225
Belgium	702	742	604,965	425,822	132	260	129,630	223,538
France	6,633	10,297	4,793,196	5,428,731	1,837	3,050	1,295,200	1,614,136
Portugal	661	246	559,304	182,877	—	—	—	—
Spain	1,238	236	1,226,778	215,871	986	337	1,372,418	305,604
Italy	2,258	721	4,071,225	1,446,828	454	219	902,693	439,407
Austria Hungary	253	21	553,581	40,478	286	—	645,344	—
Greece	193	46	348,448	75,702	533	369	1,003,029	269,813
Bulgaria	17	—	36,043	—	—	—	—	—
Roumania	81	13	160,085	22,614	—	—	—	—
Turkey	108	13	198,163	25,105	—	—	—	—
Rest of Europe and Mediterranean Coasts of Africa, and Asia	720	329	855,368	436,423	—	—	—	—
Totals Europe and Mediterranean Coasts of Africa, and Asia	22,433	16,066	21,073,235	10,277,836	15,421	10,680	14,553,711	6,987,236
United Kingdom	—	—	—	—	10,635	6,519	14,021,408	5,704,370
British Possessions	916	797	1,406,990	1,164,336	—	—	—	—
Egypt	548	217	1,276,037	569,569	—	—	—	—
Argentine	769	109	1,790,498	279,837	—	—	—	—
Brazil	465	58	1,073,427	161,955	—	—	—	—
Uruguay	165	30	359,939	78,510	—	—	—	—
Chile	198	5	476,709	14,546	—	—	—	—
Canary Islands and Madeira	339	79	561,074	172,990	—	—	—	—
Africa	168	122	296,541	280,852	—	—	—	—
Asia	74	15	236,914	24,102	—	—	—	—
America (U.S.A.)	60	25	111,373	63,877	1	158	3,324	291,187
Rest of American Continent and Islands	55	14	87,626	34,795	—	—	—	—
Other Foreign Countries	—	61	—	207,386	133	241	171,920	347,798
Totals	3,757	1,532	7,677,128	3,052,755	10,769	6,918	14,196,652	6,343,355
Grand Totals	26,190	17,598	28,750,363	13,330,591	26,190	17,598	28,750,363	13,330,591

COAL PRODUCTION AND DISTRIBUTION OF THE UNITED KINGDOM. (*See diagrams on page* 506.)

Year.	Total production. (Thousand tons.)	Home consumption. (Thousand tons.)	Exported * (Thousand tons.)	Bunkers. (Foreign trade.) (Thousand tons.)
1902	227,095	168,788	43,159	15,148
1903	230,334	168,584	44,950	16,800
1904	232,428	168,981	46,256	17,191
1905	236,129	171,256	47,477	17,396
1906	251,068	176,878	55,600	18,590
1907	267,831	185,602	63,610	18,619
1908	261,529	179,508	62,547	19,474
1909	263,774	180,983	63,077	19,714
1910	264,433	182,822	62,085	19,526
1911	271,892	188,029	64,599	19,264
1912	260,416	177,681	64,444	18,291
1913	287,412	192,980	73,400	21,032
1914	265,430	187,854	59,040	18,536
1915	253,179	196,013	43,535	13,631
1916	255,846	204,506	38,352	12,988
1917	248,041	202,817	34,996	10,228
1918	226,557	186,048	31,753	8,756
1919	229,037	181,766	35,250	12,021
1920	229,295	190,523	24,932	13,840
1921	164,081	128,494	24,661	10,926

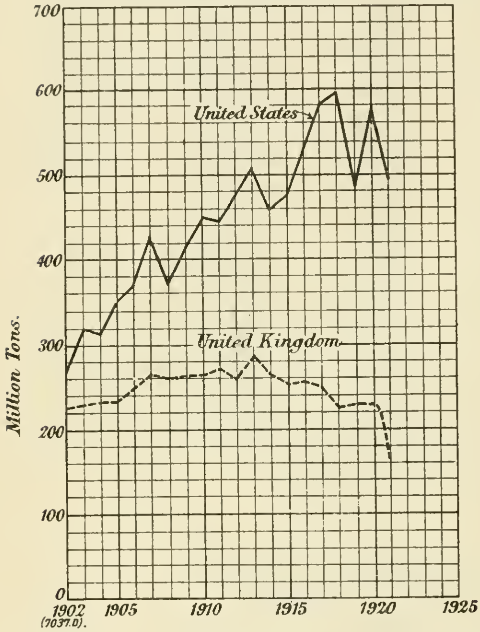
* Excluding coke and manufactured fuel.

COAL PRODUCTION AND DISTRIBUTION OF THE UNITED STATES. (*See diagrams on page* 506.)

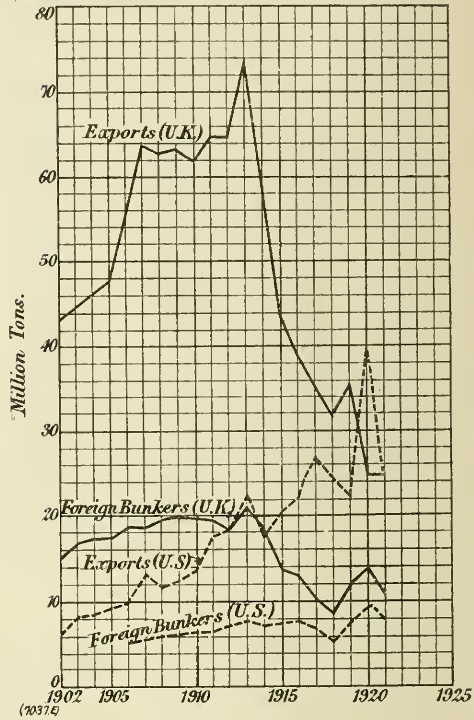
Year.	Total production.* (Thousand tons.)	Home consumption. (Thousand tons.)	Exported. (Thousand tons.)	Bunkers. (Foreign trade.) (Thousand tons.)
1902	269,278	Figures not available	6,127	Figures not available
1903	321,067	,,	8,312	,,
1904	314,122	,,	8,573	,,
1905	350,645	,,	9,189	,,
1906	369,783	354,736	9,922	5,125
1907	428,895	409,988	13,153	5,754
1908	370,838	352,961	11,853	6,024
1909	411,469	392,813	12,537	6,119
1910	449,283	429,031	13,806	6,446
1911	443,188	419,088	17,433	6,667
1912	477,202	451,713	18,149	7,340
1913	508,893	479,051	22,141	7,701
1914	458,505	433,607	17,632	7,266
1915	474,660	446,884	20,305	7,471
1916	526,874	495,905	23,143	7,826
1917	581,610	548,078	26,649	6,883
1918	595,546	565,622	24,392	5,532
1919	487,639	457,847	22,449	7,343
1920	576,485	527,908	39,215	9,362
1921	494,915	462,539	24,829	7,547

* Figures given include both anthracite and bituminous coal.

PRODUCTION OF COAL IN THE UNITED KINGDOM & THE UNITED STATES.



EXPORTS OF COAL FROM THE UNITED KINGDOM & THE UNITED STATES, ALSO QUANTITIES SUPPLIED FOR BUNKERING VESSELS IN FOREIGN TRADE.



PRICES OF BRITISH BUNKER COALS, 1914 TO 1922.

Class of Coal.	Average prices 1914		Highest and Lowest Prices. 1915		1916		1917		1918		1919		1920		1921		1922 (to Sept.)	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Durham Bunkers—(Tyne special)	12	8½	30	0	42	6	26	6	75	0	100	0	120	0	60	0	25	0
			12	6	22	6	20	0	25	0	32	0	33	6	26	0	19	6
Durham Bunkers—(Tyne ordinary)	12	0½	25	0	39	0	24	0	65	0	90	0	115	0	52	0	23	0
			10	3	18	0	16	0	24	0	31	0	32	0	24	0	19	0
Cardiff Bunkers—Small (class 1)	9	6	23	6	34	0	21	6	28	6	85	0	97	6	55	0	23	0
			10	0	14	6	13	0	21	6	28	6	35	0	18	6	16	6
Cardiff Bunkers—No. 2, Rhondda through	13	0	24	0	40	0	25	0	35	6	80	0	110	0	50	0	24	0
			12	0	15	6	16	6	23	6	35	6	50	0	20	0	18	0
South Derbyshire—Steam hard	—		26	3	42	6	35	0	70	0	70	0	80	0	53	0	28	0
			14	9	20	6	24	0	30	0	37	0	37	0	26	0	23	6
Yorkshire nuts—Doubles	12	7½	21	0	28	0	27	6	60	0	60	0	80	0	50	0	30	0
			14	6	21	0	24	0	25	0	32	0	32	0	27	0	22	0
Scotch Navigation—f.o.b. Glasgow	16	1½	26	0	40	0	32	6	70	0	95	0	97	6	75	0	27	0
			13	9	24	0	26	0	30	0	37	0	72	6	26	0	25	0
Scotch Navigation—f.o.b. Fife Ports	13	3	30	0	50	0	33	6	70	0	110	0	142	0	60	0	28	0
			16	6	23	0	27	0	31	0	38	0	73	0	28	0	26	0
Best Lancashire—Steam	—		—		26	0	27	6	65	0	47	6	50	0	47	6	26	6
					21	6	23	0	27	6	34	6	37	6	24	0	20	0

STATEMENT SHOWING THE NATIONALITY AND NET TONNAGE OF VESSELS WHICH ENTERED AND CLEARED WITH CARGOES AND IN BALLAST IN THE FOREIGN TRADE OF THE UNITED STATES OF AMERICA FOR THE YEARS ENDED 30TH JUNE, 1913, AND 31ST DECEMBER, 1920. (*See diagram* A, *page* 508.)

Nationality.	Entrances.		Clearances.		Percentages.			
					Entrances.		Clearances.	
	1913.	1920.	1913.	1920.	1913.	1920.	1913.	1920.
	Tons.*	Tons.*	Tons.*	Tons.*				
American	13,073	32,119	13,946	34,053	25·8	50·1	27·3	50·2
British	24,532	21,735	24,289	22,540	48·5	33·9	47·5	33·3
Other Nationalities:—								
Austrian	438	—	424	—	0·9	—	0·8	—
Belgian	352	373	356	420	0·7	0·6	0·7	0·6
Danish	481	567	446	621	0·9	0·9	0·9	0·9
Dutch	1,049	966	1,077	1,149	2·1	1.5	2·1	1·7
French	1,027	1,144	1,034	1,191	2·0	1·8	2·0	1·8
German	4,578	30	4,587	32	9·0	—	9·0	—
Italian	838	1,122	802	1,425	1·7	1·8	1·6	2·1
Norwegian . . .	2,774	2,319	2,798	2,453	5·5	3·6	5·5	3·6
Portuguese . . .	14	41	15	56	—	0·1	—	0·1
Russian	130	30	130	32	0·2	—	0·2	—
Spanish	391	834	374	885	0·8	1.3	0·7	1·3
Swedish	60	355	65	388	0·1	0·6	0·1	0·6
Japanese	394	1,424	287	1,396	0·8	2·2	0·6	2·1
All other Nationalities	510	1,045	523	1,176	1·0	1·6	1·0	1·7
Total . . .	50,639*	64,104*	51,152*	67,817*	100·0	100·0	100·0	100·0

	Entrances and Clearances.			Percentage of Total.		Percentage. Increase or Decrease.
	1913.	1920.	Difference.	1913.	1920.	
	Tons.*	Tons.*	Tons.*			
American . . .	27,018	66,172	Increase 39,154	27	50	Increase 145
British	48,821	44,275	Decrease 4,546	48	34	Decrease 9
Other Nationalities	25.952	21,474	Decrease 4,478	25	16	Decrease 17
Total . . .	101,791*	131,921*	Increase 30,130*	100	100	Increase 30

* *Figures in thousands*, i.e. *hundreds omitted.*

PROPORTION OF U.S.A. EXPORTS CARRIED IN BRITISH, AMERICAN, AND OTHER VESSELS, AS SHOWN BY THE CLEARANCES WITH CARGOES IN THE OVERSEAS TRADE OF THE UNITED STATES OF AMERICA. (*See diagram* B, *page* 508.)

	Clearances with Cargoes.			
	1913.	Percentage 1913.	1920.	Percentage 1920.
	Net Tons.		Net Tons.	
British Vessels	21,825,638	49	20,094,948	37
American Vessels	10,917,760	25	20,308,012	44
All other Vessels	11,739,449	26	10,649,042	19
Total Clearances with Cargoes .	44,482,847	100	55,052,002	100

PERCENTAGE OF UNITED STATES IMPORTS AND EXPORTS CARRIED IN AMERICAN VESSELS.—(BY TEN-YEAR PERIODS GENERALLY.)

Fiscal Year.	By Sea (including all Great Lakes water-borne foreign Commerce). In American Vessels. Value in Dollars.	In Foreign Vessels. Value in Dollars.	Total. Value in Dollars.	Per cent. American Vessels.	By Land Vehicles. Value in Dollars.	Total by Land and Sea. Value in Dollars
1821	113,210,462	14,358,235	127,559,679	88·7	—	—
1830	129,918,458	14,447,970	144,366,428	89·9	—	—
1840	198,424,609	40,802,856	239,227,465	82·9	—	—
1850	230,272,084	90,764,954	330,037,038	72·5	—	—
1860	507,247,757	255,040,793	762,288,550	66·5	—	—
1870	352,969,401	638,927,488	991,896,889	35·6	—	991,896,889
1880	258,346,577	1,244,265,433	1,482,612,011	17·4	20,981,393	1,503,593,404
1890	202,451,086	1,371,116,744	1,573,567,830	12·9	73,571,263	1,647,139,093
1900	195,084,192	1,894,444,424	2,089,528,616	9·3	154,895,650	2,224,424,266
1910	260,837,147	2,721,962,475	2,982,799,622	8·7	319,132,528	3,301,932,150
1913	381,032,496	3,392,028,429	3,773,060,925	10·1	505,831,459	4,278,892.384
1914	368,359,756	3,417,108,756	3,785,468,512	9·7	473,036,293	4,258,504,805
1915	571,931,912	2,420,693,563	3,992,625,475	14·3	450,133,605	4,442,759,080
1916	948,908,216	4,877,132,995	5,826,041,211	16·3	705,325,184	6,531,366,395
1917	1,452,086,468	6,367,408,665	7,819,495,133	18·6	1,129,908,446	8,949,403,579
1918	1,688,495,946	6,015,204,510	7,703,700,456	21·9	1,161,666,318	8,865,366,774
1919*	3,823,763,693	6,679,895,162	10,503,658,855	36·4	1,321,132,067	11,824,790,922
1920*	5,154,337,761	6,830,563,705	11,984,901,466	43·0	1,523,256,493	13,508,157,959
1921*	2,166,796,204	3,908,315,192	6,075,111,396	35·7	919,036,703	6,994,148,099

* Up to and including 1918 the statistics given are for years ended on June 30; from 1919 onwards they are given for calendar years.

DIAGRAM A.—SHOWING ENTRANCES AND CLEARANCES WITH CARGOES AND IN BALLAST OF BRITISH, AMERICAN, AND OTHER VESSELS IN THE FOREIGN OVERSEAS TRADE OF THE UNITED STATES, 1913 AND 1920.

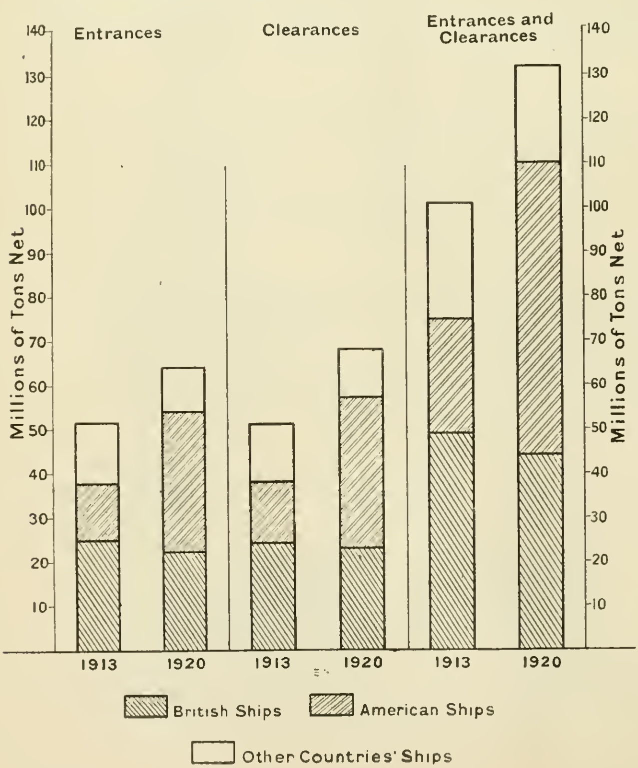
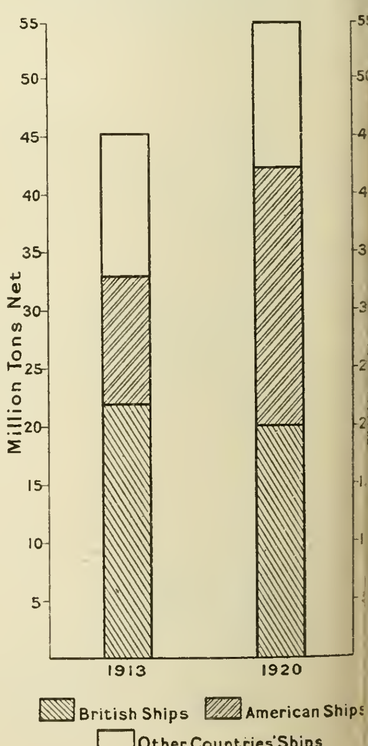


DIAGRAM B.—SHOWING THE PROPORTION OF U.S. SEABORNE EXPORTS CARRIED IN BRITISH, AMERICAN AND OTHER VESSELS, 1913 AND 1920.



FOREIGN TRADE OF THE UNITED STATES OF AMERICA,

1913 AND 1921.

—	Imports.		Exports.		Imports and Exports.		Percentage of Total Imports.		Percentage of Total Exports.		Percentage of Total Imports and Exports.	
	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.
	Million $.	Million $.	Million $.	Million $.	Million $.	Million $.						
Overland	115.3	322.0	390.5	597.0	505.8	919.0	6·4	12·8	15·8	13·3	11·8	13·1
Oversea—												
In American vessels . .	193.1	765.2	187.9	1401.6	381.0	2166.8	10·6	30·5	7·6	31·3	8·9	31·0
In Foreign vessels . . .	1504.6	1421.8	1887.5	2486.5	3392.1	3908.3	83·0	56·7	76·6	55·4	79·3	55·9
Total Oversea . .	1697.7	2187.0	2075.4	3888.1	3773.1	6075.1	93·6	87·2	84·2	96·7	88·2	86·9
Grand Total . .	1813.0	2509.0	2465.9	4485.1	4278.9	6994.1	100·0	100·0	100·0	100·0	100·0	100·0

FOREIGN TRADE OF THE UNITED STATES OF AMERICA.

STATEMENT SHOWING THE ENTRANCES AND CLEARANCES IN THE FOREIGN TRADE OF THE UNITED STATES OF AMERICA FOR THE YEARS 1913 AND 1921.

Nationality of Vessels.	Entrances.		Clearances.		Entrances and Clearances.		Percentages.					
							Entrances.		Clearances.		Entrances and Clearances.	
—	1913	1921.	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.	1913.	1921.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.						
American . . .	13,072,567	31,184,704	13,945,801	30,180,809	27,018,368	61,365,513	25·8	50·0	27·3	48·2	26·5	49·1
Foreign . . .	37,566,606	31,100,293	37,206,158	32,476,358	74,772,764	63,576,651	74·2	50·0	72·7	51·8	73·5	50·9
Total . .	50,639,173	62,284,997	51,151,959	62,657,167	101,791,132	124,942,164	100·0	100·0	100·0	100·0	100·0	100·0

THE BOARD OF TRADE.

GREAT GEORGE STREET, LONDON, S.W.1.

Telephone: Victoria 3840.

GENERAL.

President: The Rt. Hon. Stanley Baldwin, M.P. *Private Secretaries:* C. Patrick Duff and E. W. Reardon. *Parliamentary Private Secretary:* J. C. C. Davidson, C.B., M.P. (unpaid).

Parliamentary Secretaries:

BOARD OF TRADE (Great George Street, S.W.1).—Sir William Mitchell-Thomson, Bart., K.B.E., M.P. *Private Secretary:* C. J. Pyke.

DEPARTMENT OF OVERSEAS TRADE (DEVELOPMENT AND INTELLIGENCE) (35, Old Queen Street, London, S.W.1)—Sir Philip Lloyd-Greame, K.B.E., M.C., M.P. *Private Secretaries:* A. E. Overton, M.C., B. C. Beauchamp (unpaid) (Board of Trade); and A. Mullins, C.B.E. (Department of Overseas Trade). *Parliamentary Private Secretary:* Capt. G. E. W. Bowyer, M.C., M.P. (unpaid).

DEPARTMENT OF MINES (Cromwell House, Dean Stanley Street, London, S.W.1).—Rt. Hon. W. C. Bridgman, M.P. *Private Secretary:* A. A. Hopper.

Chief Economic Adviser to H.M. Government and Vice-President of the Board of Trade Council: Sir H. Llewellyn Smith, G.C.B. *Private Secretaries:* H. F. Hill and W. G. Fergusson.

Permanent Secretary: Sir Sydney Chapman, K.C.B., C.B.E. *Private Secretaries:* W. B. Brown and W. J. Galley.

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Secretary to Board of Trade Council: G. C. L. Maunder.

PERMANENT DEPARTMENTS AND SUB-DEPARTMENTS.

DEPARTMENT OF MINES, Cromwell House, Dean Stanley Street, London, S.W.1. (Tel. No. Victoria 9310).—*Permanent Under-Secretary:* E, A. Gowers, C.B.

COMMERCIAL RELATIONS AND TREATIES, Great George Street, London, S.W.1. (Tel. No. Victoria 3840).—*Assistant Secretary:* H. Fountain, C.B., C.M.G.

OVERSEAS TRADE DEVELOPMENT AND INTELLIGENCE (Joint Department with Foreign Office), 35, Old Queen Street, London, S.W.1. (Tel. No. Victoria 9040).—*Comptroller-General:* Sir W. H. Clark, K.C.S.I., C.M.G.

INDUSTRIES AND MANUFACTURES, Great George Street, London, S.W.1. (Tel. No. Victoria 3840).—*Assistant Secretary:* Percy Ashley, C.B.

STANDARDS, 7, Old Palace Yard, London, S.W.1. (Tel. No. Victoria 3840).—*Deputy Warden:* J. E. Sears, Jun., C.B.E.

INDUSTRIAL PROPERTY (including Patent Office), Southampton Buildings, Chancery Lane, London, W.C.2. (Tel. No. City 5301).—*Comptroller-General:* W. Temple Franks, C.B.

STATISTICAL, Great George Street, London, S.W 1 (Tel. No. Victoria 3840).—*Assistant Secretary:* A. W. Flux, C.B.

MERCANTILE MARINE, Sanctuary Buildings, Great Smith Street, London, S.W.1. (Tel. No. Victoria 8740). *Senior Assistant Secretary:* C. Hipwood, C.B.

OFFICE OF REGISTRAR-GENERAL OF SHIPPING AND SEAMEN, Tower Hill, London, E.1. (Tel. No. Central 74).—*Registrar-General:* J. Blake Harrold, M.B.E. *Assistant Registrar-General:* C. L. Compton, R.N.R.

CONSULTATIVE BRANCH, 68, Victoria Street, London, S.W.1. (Tel. No Victoria 2558). *Engineer-Surveyor-in-Chief:* T. Carlton. O.B.E. *Deputy Engineer-Surveyor-in-Chief:* A. E. Laslett. *Engineer-Surveyors:* H. J. Vose, J.

Cormack, W. T. Williams, O.B.E., H. Cranwell, and G. C. Blair. *Principal Ship Surveyor:* E. W. Colvill. *Deputy Principal Ship Surveyor:* W. J. Elvy. *Assistant to the Principal Ship Surveyor:* A. J. Daniel. *Ship Surveyors:* A. E. Lavers, J. T. Munden, W. J. Wilton, A. T. Metcalfe, H. E. Steel, G. Daniel, C. S. Lewis, A. E. Dobinson, L. Lethbridge, and E. G. Perkins. *Principal Surveyor for Tonnage:* T. F. Jenkins. *Assistant to the Principal Surveyor for Tonnage:* F. W. Bickle. *Ship Surveyors:* C. R. Godfree, G. T. Cheney, P. T. Daniel, and H. Collins.

PRINCIPAL EXAMINER OF MASTERS AND MATES, 68, Victoria Street, London, S.W.1. (Tel. No. Victoria 3507).—*Principal Examiner:* W. Ellery.

CHIEF EXAMINER OF ENGINEERS, 68, Victoria Street, London, S.W.1 (Tel. No. Victoria 2558).—*Chief Engineer:* C. W. Roberts. *Engineer Surveyor:* G. C. Blair.

SURVEY STAFF, 79, Mark Lane, London, E.C.3 (Tel. No. Avenue 4546).—*Principal Officer for London District:* R. C. Warden, C.B.E. *Chief Inspector of Ships' Provisions:* C. A. Whyte.

MERCANTILE MARINE OFFICES, Dock Street, London, E.1.—*Chief Superintendent:* J. G. Dendy (acting). *Superintendents:* J. V. Bloomfield (acting) (Poplar), J. R. Gilchrist (Victoria Docks), and J. G. White (Tilbury).

BOARD OF TRADE STORES, POPLAR, London, E.1.—*Superintendent:* A. Thomas.

COMPANIES, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Comptroller:* H. M. Winearls, O.B.E.

WINDING-UP DEPARTMENT, 33, Carey Street, London, W.C.2.—*Senior Official Receiver:* H. E. Burgess.

BANKRUPTCY, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Inspector-General:* H. F. Carhill.

HIGH COURT BRANCH, Bankruptcy Buildings, Carey Steet, London, W.C.2 (Tel. No. Holborn 6700).—*Senior Official Receiver:* W. P. Bowyer.

SOLICITOR, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Solicitor:* T. J. Barnes, C.B.E.

FINANCE, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Assistant Secretary for Finance:* H. Mead Taylor.

ESTABLISHMENT, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Principal Establishment Officer:* S. W. Clark.

INTELLIGENCE AND PARLIAMENTARY, Great George Street, London, S.W. 1 (Tel. No. Victoria 3840).—*Principal:* G. C. L. Maunder.

Board of Trade Journal, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Editor:* Harcourt Kitchin.

TEMPORARY DEPARTMENTS.

CONTROLLER OF TRADING ACCOUNTS, Great George Street, London, S.W.1 (Tel. No. Victoria 3840).—*Controller:* H. Mead Taylor.

TIMBER DISPOSAL DEPARTMENT, Great George Street, London, S.W.1 (Tel. No. Victoria 3840.—*Acting Controller:* A. M. B. Stevens.

CLEARING OFFICE FOR ENEMY DEBTS, Cornwall House, Stamford Street, London, S.E.1 (Tel. No. Hop. 5820).—*Controller:* E. Spencer Grey, C.B.

REPARATION CLAIMS DEPARTMENT, Cornwall House, Stamford Street, London, S.E.1. (Tel. No. Hop. 5820).—*Controller:* W. Neill.

FOOD DEPARTMENT, 54, Victoria Street, London, S.W.1 (Tel. No. Victoria 4020).—*Secretary:* F. H. Coller, C.B.

TECHNICAL SOCIETIES DEALING WITH NAVAL ARCHITECTURE, MARINE ENGINEERING, AND KINDRED SUBJECTS.

(*The dates given in parentheses are the dates when new officials take office.*)

United Kingdom.

Belfast Association of Engineers: President, Atholl Blair, M.B.E., M.Inst.N.A.; Hon. Treasurer, Douglas B. Marr; Hon. Secretary, H. Fildes: Address, 26, Arthur Street, Belfast (October, 1923).

British Association for the Advancement of Science: President, Sir C. S. Sherrington, G.B.E., Pres. R.S.; Treasurer, Dr. E. Griffiths, F.R.S; General Secretaries, Prof. J. L. Myres, D.Sc., O.B.E., and F. E. Smith, O.B.E., F.R.S.; Secretary, O. J. R. Howarth, O.B.E., M.A.: Address, Burlington House, London, W. 1.

Civil Engineers, Institution of: President, Willlam Henry Maw, LL.D.; Hon. Secretary, J. H. T. Tudsbury, D.Sc.; Secretary, H. H. Jeffcott, B.A.I., Sc.D.; Telephone, Victoria 4577; Telegrams "Institution, London": Address, Great George Street, Westminster, London, S.W. 1 (November, 1923).

Civil Engineers of Ireland, Institution of: President, Prof. Pierce F. Purcell, M.A., M.A.I.; Secretary, J. E. Smith: Address, 35, Dawson Street, Dublin (April, 1923).

Concrete Institute, The: President, E. Fiander Etchells, A.M.Inst.C.E.; Secretary, Captain M. G. Kiddy, F.I.S.A.; Telephone, Victoria 2112; Telegrams, "Coninst, Churton, London"; Address, Denison House, 296, Vauxhall Bridge Road, London, S.W. 1 (November, 1923).

Electrical Engineers, Institution of: President, F. Gill, O.B.E.; Secretary, P. F. Rowell; Telephone, Gerrard 764; Telegrams, "Voltampere, Phone, London": Address, Savoy Place, Victoria Embankment, London, W.C. 2 (October 1, 1923).

Engineers and Shipbuilders in Scotland, Institution of: President, Harold E. Yarrow, C.B.E.; Secretary, E. H. Parker; Telephone, Central 5181; Telegrams, "Institution, Elmbank Crescent, Glasgow": Address, Elmbank Crescent, Glasgow (October, 1923).

Engineers, (Inc.), Society of: President, T. J. Gueritte; Hon. Treasurer and Hon. Secretary, C. T. Walrond; Secretary, A. S. E. Ackermann; Telephone, Victoria 244; Telegrams, "Windolite, Vic. London": Address, 17, Victoria Street, Westminster, London, S.W. 1 (December, 1922).

Engineering and Scientific Association of Ireland, The: Hon. Secretaries, A. E. Porte and F. W. Parkes: Address, 43, Dawson Street, Dublin.

Iron and Steel Institute: President, Francis Samuelson, B.A.; Secretary, G. C. Lloyd; Telephone, Victoria 853; Telegrams, "Irosamente, Vic. London": Address, 28, Victoria Street, Westminster, London, S.W. 1 (May, 1924).

Junior Institution of Engineers (Inc.): President, Capt. H. Riall Sankey, C.B., C.B.E., R.E. (retd.); Chairman, Edgar C. West; Hon. Treasurer, W. A. Tookey; Secretary, Herbert G. Riddle; Telephone, Victoria 7423; Telegrams, "Juniorinst, Vic. London": Address, 39, Victoria Street, Westminster, London, S.W. 1 (November, 1923).

Liverpool Engineering Society: President, Professor T. B. Abell, O.B.E., M.Eng., M.Inst.N.A.; Treasurer, Professor E. W. Marchant D.Sc. (Lond.); Hon. Secretary, G. Kenyon Bell, M.Cons.E.: Address, Westminster Chambers, Royal Institution, Liverpool.

Manchester Association of Engineers: President, Daniel Adamson, M.I.Mech.E.; Treasurer, Geo. Saxon, M.I.Mech.E.; Secretary, F. Hazelton; Telephone, City 6645: Address, 120, Portland Street, Manchester (April, 1923).

Marine Engineers (Inc.), Institute of: President, Engineer Vice-Admiral Sir George G. Goodwin, K.C.B., LL.D.; Chairman of Council, John Clark; Hon. Treasurer, Alfred Robertson; Hon. Secretary, J. Adamson; Assistant Secretary, B. C. Curling; Telephone, Avenue 7525; Telegrams, "Gradation, Ald, London": Address, 85–88, Minories, London, E. 1.

Mechanical Engineers, The Institution of: President, H. S. Hele-Shaw, LL.D., D.Sc., F.R.S.; Hon. Treasurer, F. H. Norwood; Secretary, Brig.-Gen. Magnus Mowat,

C.B.E.; Assistant Secretary (General), H. T. Chapman; Assistant Secretary (Technical), J. E. Montgomrey; Telephone, Victoria 4564; Telegrams, "Mech. Parl. London": Address, Storey's Gate, St. James's Park, Westminster, London, S.W. 1 (February, 1923).

Metals, Institute of: President, Leonard Sumner, Esq., O.B.E., M.Sc.; Treasurer, A. E. Seaton, Esq., M.Inst.C.E.; Secretary, G. Shaw Scott, M.Sc.; Telephone, Victoria 2320; Telegrams, "Victoria 2320": Address, 36, Victoria Street, Westminster, London, S.W. 1 (March, 1923).

Nautical Research, The Society for: President, Admiral of the Fleet, Sir F. C. Doveton Sturdee, Bart., G.C.B., K.C.M.G., C.V.O., LL.D.; Hon. Secretary and Treasurer, Professor Geoffrey Callender, M.A., F.R.Hist S.: Address, Royal Naval College, Greenwich, London, S.E. 10 (June, 1923).

Naval Architects, Institution of: President, Duke of Northumberland; Hon. Treasurer, Sir Charles Ellis, G.B.E., K.C.B.; Secretary, R. W. Dana, O.B.E., M.A.; Telephone, Gerrard 6311; Telegrams, "Sinai, Westrand, London": Address, 5, Adelphi Terrace, London, W.C. 2.

Navy Records Society: President, Lord George Hamilton, G.C.S.I.; Hon. Treasurer, Sir W. Graham Greene, K.C.B.; Secretary, W. G. Perrin: Address, Admiralty, London, S.W. 1 (June, 1923).

Newcomen Society, The: Hon. Secretary, H. W. Dickinson: Address, The Science Museum, South Kensington, London, S.W. 7.

North-East Coast Institution of Engineers and Shipbuilders: President, Sir Archibald C. Ross, K.B.E.; Secretary, E. W. Fraser-Smith; Telephone, Central 689; Telegrams, "Bolbec, Newcastle-on-Tyne": Address, Bolbec Hall, Newcastle-on-Tyne (October, 1923).

Royal Society for the Encouragement of Arts, Manufactures and Commerce: President, Field-Marshal H.R.H. The Duke of Connaught, K.G.; Chairman of Council, Lord Askwith, K.C.B., D.C.L.; Treasurers, Sir William H. Davison, K.B.E., M.P., D.L., and William Henry Maw, LL.D., M.Inst.C.E.; Secretary, G. K. Menzies, M.A.: Address, John Street, Adelphi, London, W.C. 2 (June, 1923).

Scientific Society of the Royal Technical College, The: President, J. H. Huntley, M.Inst.E.S.; Treasurer, J. E. Irvine; Secretary, Norman Young: Address, The Royal Technical College, Glasgow (March, 1924).

France.

Association Technique Maritime: Address, Quai des Grands Augustins 55, Paris.

Bureau Veritas, International Register of Shipping: Address, 31, Rue d'Offemont, Paris.

Germany.

Schiffbautechnische Gesellschaft: Address, Schumann Str. 2pt., Geschaftsstelle, Berlin N.W. 6.

Holland.

Koninklijk Institutvan Ingenieur (Shipbuilding Section): Address, Prinsessegracht 23, s'Gravenhage.

Italy.

Collegio Degli Ingegneri Navali e Meccanici in Italia: Address, Via S. Agaese 7, Genoa.

Italian Society of Naval and Mechanical Engineers: Address, Via Montallegro No. 1, Genoa.

Naval Architects, Institution of: Address, Via Montallegro No. 1, Genoa.

Japan.

Japanese Society of Naval Architects: Address, 15, Yamashirocho Kyobashiku, Tokyo.

United States.

American Society of Civil Engineers: Address, 29, West 39th Street, New York, N.Y.

American Society of Electrical Engineers: Address, 29, West 39th Street, New York, N.Y.

American Society of Mining and Mechanical Engineers: Address, 29, West 39th Street, New York, N.Y.

American Society of Naval Architects & Marine Engineers, The: Address, 29, West 39th Street, New York, N.Y.
American Society of Naval Engineers: Address, Navy Department, Washington, D.C.
Bureau of Steam Navigation: Address, Navy Department, Washington, D.C.
Franklin Institute: Secretary, R. B. Owens: Address, Philadelphia, Pa.
United States Naval Institute: Secretary and Treasurer, Lieut.-Commander G. M. Ravenscroft, U.S.N.: Address, Annapolis, Maryland.
Western Society of Engineers: Secretary, Kenneth F. Treschow: Address, William Penn Hotel, Pittsburg, Pa.

LIST OF BRITISH NAVAL AND SHIPPING ORGANISATIONS.

(*The dates given in parentheses are the dates when new officials take office.*)

Aberdeen District: Shipping Federation, Ltd.: Secretary, L. Mackinnon; Telephone, Central 245; Telegrams, "Nemesis, Aberdeen": Address, 23, Market Street, Aberdeen.
Army, Navy and Air Force Institutes: President, Admiral W. de Salis, M.V.O. (Retd.); Vice-President, Major-General Sir G. F. Ellison, K.C.M.G., C.B.; Chairman of the Board of Management, Sir C. C. Barrie, K.B.E., M.P.; Deputy Chairman of the Board of Management, G. McKechnie; General Manager, J. C. Goff; General Secretary, E. H. Cherry; Naval Secretary, Paymaster Lieut.-Commander F. J. S. Anderson, R.N.: Address, Imperial Court, Knightsbridge.
Avon and Severn District: Shipping Federation, Ltd.: Secretary, J. A. Fraser; Telephone, Bristol 3717; Telegrams, "Nemesis, Bristol": Address, 54, Prince Street, Bristol.
Baltic Mercantile and Shipping Exchange: Chairman, Newton Dunn; Secretary, J. A. Findlay: Address, St. Mary Axe, London, E.C. 3.
Barrow-in-Furness District: Shipping Federation, Ltd.: Secretary, J. M. Mawson; Telephone, Barrow-in-Furness 81; Telegrams, "Nemesis, Barrow-in-Furness": Address, 32, Strand, Barrow-in-Furness.
Belfast Shipowners' Association: Chairman, Sir George S. Clark, Bt.; Hon. Secretary and Hon. Treasurer, J. A. M. Heyn; Telephones, Belfast 2097–99; Telegrams, "Heyn, Belfast": Address, Head Line Buildings, Victoria Street, Belfast (January, 1923).
Boiler Makers and Iron and Steel Shipbuilders: Chairman, R. W. Lindsay; Vice-Chairman, Mark Hodgson; General Secretary, John Hill, J.P.; Assistant Secretary, Councillor John Barker: Address, Lifton House, Eslington Road, Newcastle-on-Tyne.
Bristol Steamship Owners' Association: Chairman, A. S. Ray; Vice-Chairman, G. F. Cullen; Acting Hon. Secretary, W. G. McCann; Telephone, Bristol 1836: Address, 18, St. Augustine's Parade, Bristol (February, 1923).
Britannia Steam Ship Insurance Association, Ltd.: Chairman, Sir Ernest W. Glover, Bart.; Managers, Tindall Riley & Co.: Address, 17, Gracechurch Street, London, E.C. 3.
British Corporation for the Survey and Registry of Shipping: Hon. President, Francis Henderson; Hon. Vice-President, Sir Archibald Denny, Bart., LL.D.; Chairman, Robert Clark; Vice-Chairman, Sir Wm. H. Raeburn, M.P.; Chief Surveyor, J. Foster King, C.B.E.; Secretary, John Fleming; Telephone Numbers, Cent. 8152 and 8153; Telegraphic Address, "Seaworthy, Glasgow": Address, 14, Blythswood Square, Glasgow (February, 1923).
British and Foreign Sailors' Society, Inc.: President, The Rt. Hon. Lord Radstock, C.B.E.; Treasurer, Sir Frederick Green, K.B.E.; Vice-Chairman, G. F. S. Edwards; Chairman of Finance, Sir Ernest Glover, Bart.; General Secretary, Herbert E. Barker; Organising Secretary, William J. Hawkey; Telephones, East 4350–1; Telegrams, "Sailordom, Step, London": Address, The Passmore Edwards Sailors' Palace, 680, Commercial Road, London, E. 14.
British Industries, Federation of: President, Col. O. C. Armstrong, D.S.O.; Chairman, Sir Wm. B. Peat, C.V.O.; Deputy Chairman, Sir E. Fitzjohn Oldham; Director, R. T. Nugent; Secretary, D. L. Walker; Telephones, 6050–6056; Telegrams, "Fobusty, Piccy, London": Address, 39, St. James's Square, London, S.W. 1 (November, 1923).

British Marine Salvage Co., Ltd., The: Chairman, J. A. Roxburgh; Vice-Chairman, R. G. Service; Secretary and Treasurer, William Stewart: Address, Royal Exchange Buildings, Glasgow.

British Mercantile Marine (National Maritime Board): Chairmen, Sir F. Shadforth Watts and J. Havelock Wilson, C.H., C.B.E., M.P.; General Secretary, G. A. Vallance; Telephone, Holborn 3074; Telegrams, "Joisec, London": Head Office, 3 and 4, Clements' Inn, London, W.C. 2 (April, 1923).

British Sailing Ship Owners' Association, Ltd.: Chairman of the Executive Committee, A. W. Daniels; Vice-Chairman of the Executive Committee, J. H. Stokes; Secretary, H. M. Cleminson: Address, 24, St. Mary Axe, London, E.C. 3.

British Shipowners' Mutual Protection and Indemnity Association, Ltd.: Managers, A. Bilbrough & Co., Ltd.: Address, 23, Rood Lane, London, E.C. 3.

Cardiff and Bristol Channel Incorporated Shipowners' Association: Chairman, Frederick Jones; Vice-Chairman, W. E. Hinde; Secretary, W. R. Hawkins; Telephone, Cardiff, 242; Telegrams, "Ship, Cardiff": Address, 6, The Exchange, Cardiff (February, 1923).

Cardiff District: Shipping Federation, Ltd.: Secretary, W. R. Hawkins; Telephone, Cardiff 242; Telegrams, "Nemesis, Cardiff": Address, 6, The Exchange, Cardiff.

Chamber of Shipping of the United Kingdom: President, Sir Frederick Lewis, Bt.: Vice-President, Sir Ernest Glover, Bt.; General Manager, H. M. Cleminson; Assistant General Manager, P. M. Hill; Telephone, Avenue 7360; Telegrams, "Logboard, Stock, London": Address, 28, St. Mary Axe, London, E.C. 3 (February, 1923).

Chartered Shipbrokers, Institute of: President, Sir William H. Turner; Chairman, F. W. Temperley; Secretary, J. A. Findlay: Address, 24, St. Mary Axe, London, E.C. 3.

Clyde District: Shipping Federation, Ltd.: Secretary, Walter Patterson, M.B.E., J.P.; Telephone, Argyle 591; Telegrams, "Mutuality, Glasgow": Address, 94, Hope Street, Glasgow.

Clyde Sailing Shipowners' Association, Ltd.: Chairman, Colonel George Milne, C.B.; Secretary, Walter Patterson, M.B.E., J.P.: Address, 94, Hope Street, Glasgow.

Clyde Sailing Ship Small Damage Association, Ltd.: Chairman, James Hardie; Secretary, Walter Patterson, M.B.E., J.P.: Address, 94, Hope Street, Glasgow.

Clyde Steamship Owners' Association: President, S. C. Hogarth, J.P.; Secretary, Walter Patterson, M.B.E., J.P.: Address, 94, Hope Street, Glasgow.

Consulting Marine Engineers and Ship Surveyors, The Society of: President, George Humphreys; Vice-Presidents, C. E. Smith and J. Denholm Young; Secretary, R. K. Munro; Telephone, Avenue 2713: Address, 32, Fenchurch Street, London, E.C. 3 (February, 1923).

Dundee District: Shipping Federation, Ltd.: Secretary, R. T. Leitch; Telephone, Dundee 2196; Telegrams, "Nemesis, Dundee": Address, 65, Trade Lane, Dundee.

Empire New Mutual Marine Association, Ltd., The: Managers, A. Bilbrough & Co., Ltd.: Address, 23, Rood Lane, London, E.C. 3.

Empire Steamship Assurance Association, Ltd., The: Managers, A. Bilbrough & Co., Ltd.: Address, 23, Rood Lane, London, E.C. 3.

Employers' Association of the Port of Liverpool, The: Address, Dock Board Building, Pier Head, Liverpool.

Engineering and Shipbuilding Trades, Federation of: President, John Hill; Vice-President, A. Wilkie, M.P.; Treasurer, A. A. H. Findlay; Secretary, F. Smith; Telephone, Museum 3078: Address, 15–16, Sicilian House, Southampton Row, London, W.C. 1 (May, 1923).

Forth District: Shipping Federation, Ltd.: Secretary, A. C. Cormack; Telephone, Leith 787; Telegrams, "Nemesis, Leith": Address, 7, John's Place, Leith.

General Register and Record Office of Shipping and Seamen. *See under* Board of Trade, at bottom of page 510.

Glasgow Salvage Association, The: Committee, William McInnes (Chairman), J. Patrick Cuthbert (Deputy Chairman), R. G. Service, D. C. Dawson, and T. R. Clark; Wreck Agent, Captain William Burns; Secretary and Treasurer, William Stewart; Telephone, Central 9520; Telegrams "Underwriters, Glasgow": Address, Underwriters' Rooms, Royal Exchange Buildings, Glasgow.

Glasgow Shipowners' Association: Chairman, W. S. Workman; Deputy Chairman, W. Betts Donaldson; Secretary, Jas. A. Mackenzie; Telephone, Central 6608, Glasgow; Telegrams, "Maritime, Glasgow": Address, 150, St. Vincent Street, Glasgow (January, 1923).

Goole District: Shipping Federation, Ltd.: Secretary, J. Umpleby; Telephone, Goole 37; Telegrams, "Nemesis, Goole": Address, 9, Aire Street, Goole.

Grangemouth District: Shipping Federation, Ltd.: Secretary, H. A. Salvesen; Telephone, Grangemouth 1; Telegrams, "Nemesis, Grangemouth": Address, Grangemouth Road, Grangemouth, N.B.

Gravesend Sea School: Chairman, Colonel Leslie Wilson, C.M.G., C.B.E., M.P.: School Captain, Captain O. H. Lewis; Hon. Secretary, Miss D. A. Wigner; Address, 28, St. Mary Axe, London, E.C. 3.

Hartlepools District: Shipping Federation, Ltd.: Secretary, William Allen; Telephone, West Hartlepool 108; Telegrams, "Nemesis, West Hartlepool": Address, 4, Victoria Terrace, West Hartlepool.

Hartlepools Shipowners' Society, The: Chairman, Lt.-Col. J. H. Ropner, J.P., D.L.; Secretary, William Allen: Address, 4, Victoria Terrace, West Hartlepool.

Hull Incorporated Chamber of Commerce and Shipping (Shipping Section): Chairman, Oswald Sanderson; Secretary, A. Whitehead: Address, Chamber of Commerce, Hull.

Humber Branch: National Sailmaking Employers' Association: Secretary, R. A. Spiers: Address, 24, Marlborough Avenue, Hull.

Humber District: Shipping Federation, Ltd.: Secretary, A. Whitehead; Telephone Hull 384; Telegrams, "Nemesis, Hull": Address, Samman House, Bowlalley Lane, Hull.

Imperial Merchant Service Guild, The: Chairman, Captain J. G. Mutter; Vice-Chairman, Captain W. Baker; Treasurer, C. K. Mitchell; Secretary, Lieut. T. W. Moore, C.B.E., R.N.R.; Assistant Secretary, G. B. Say, M.B.E.; Telephones, Bank 8971–2; Telegrams, "Dolphin, Liverpool": Head Office, The Arcade, Lord Street, Liverpool (March, 1923).

Incorporated Soldiers' and Sailors' Help Society: President, H.R.H. The Princess, Christian; Chairman of Executive Committee, Major-General Lord Cheylesmore, K.C.M.G., K.C.V.O.; Vice-Chairman, Lieut.-General G. H. Moncrieff, C.B.E.; Secretary, Major-General Sir Bertram Boyce, K.C.M.G., C.B., D.S.O.; Telephone, Kensington No. 1; Telegrams, "Peaceful, London": Address, 122, Brompton Road, London, S.W. 1.

International Shipping Federation, Ltd., The: Chairman, Sir F. Shadforth Watts; General Manager, Cuthbert Laws; Secretary, Michael Brett: Chief Office, 24, St. Mary Axe, London, E.C. 3.

Lancashire and National Sea Training Homes for Boys: President, The Rt. Hon. the Earl of Derby, K.G.; Chairman, Sir Alfred Read; Superintendent, Captain D. Agnew, N.R.; Secretary, Miss Manning; Telephone, Central 3887: Address, Tower Building, Liverpool.

Leith Shipowners' Society: Chairman, Dr. James Currie; Hon. Secretary, James Low: Address, 7, John's Place, Leith.

Liverpool District: Shipping Federation, Ltd.: Registrar, A. D. Haws; Telephone, Bank 3478; Telegrams, "Fedreg, Liverpool": Address, 1 and 3, Mariners' Parade, Liverpool.

Liverpool and London Steamship Protection Association, Ltd., The: Chairman, J. Bruce Ismay; Vice-Chairman, Thomas Rome; Manager and Secretary, Sir Norman Hill, Bt.; Assistant Manager, Vivian D. Heyne; Telephone, Central 1446 (3 lines); Telegrams, "Grayhill, Liverpool": Address, 10, Water Street, Liverpool (February, 1923).

Liverpool and London War Risks Insurance Association, Ltd., The: Chairman, J. Bruce Ismay; Vice-Chairman, Sir Alfred A. Booth, Bt.; Manager, Sir Norman Hill, Bt.; Assistant Manager, Vivian D. Heyne; Telephone, Central 1446 (3 lines); Telegrams, "Grayhill, Liverpool": Address, 10, Water Street, Liverpool (February, 1923).

Liverpool Master Stevedores' and Master Porters' Association of: Chairman, Henry E. Wright; Vice-Chairman, John E. Jones; Hon. Treasurer, G. W. Sutcliffe Rhodes; Hon. Secretary, W. H. Boase: Address, Tower Buildings, Liverpool.

Liverpool Navy League: President, The Rt. Hon. the Earl of Derby, K.G.; Chairman, John Glynn; Hon. Secretary, Miss Manning; Telephone, Central 3887: Address, Tower Building, Liverpool.

Liverpool Shipowners' Association: Chairman, Alex. Bicket, Junr.; Secretaries, Weightman Pedder & Co.; Telegrams, "Weightman, Liverpool": Address, Barclay's Bank Building, Water Street, Liverpool (January, 1923).

Liverpool Shipping and Forwarding Agents' Association (Inc.): President, Arthur Cook; Council, James Jude (Chairman), E. H. Eckes (Vice-Chairman), F. J. Adams, R. A. Barker, D. G. Evans, W. Esplen, J. H. Hughes, J. Mitchell-Jones, W. R. Lloyd, D. Maccabe, W. S. Johnson; Hon. Secretary, S. L. Jude; Telephone, Bank 8705; Telegrams, "Impartial, Liverpool": Address, 20, Redcross Street, Liverpool (October, 1923).

Liverpool Steam Ship Owners' Association: Chairman, A. D. Mearns; Vice-Chairman, Richard D. Holt; Secretary, Sir Norman Hill, Bt.; Assistant Secretary, F. Russell Roberts; Telephones, Central 1446 (3 lines); Telegrams, "Grayhill, Liverpool": Address, 10, Water Street, Liverpool (February, 1923).

Liverpool Underwriters' Association, Inc., The: Chairman, Samuel Barker; Deputy-Chairman, G. H. Court; Secretary, T. A. Bellew: Address, Exchange Buildings, Liverpool.

Lloyd's: Chairman, Arthur L. Sturge; Deputy Chairman, Henry J. F. Dumas; Telephone, Central 680; Telegrams, "Lloyds, London": Address, Royal Exchange, London, E.C. 3.

Lloyds' Register of Shipping: Chairman, J. Herbert Scrutton; Chief Ship Surveyor, Sir Westcott S. Abell, K.B.E., M.Eng., M.Inst.C.E.; Chief Engineer Surveyor, H. Ruck-Keene, M.Inst.C.E.; Secretary, Andrew Scott; Telephones, City 8160–62; Telegrams, "Committee, Fen, London": Address, 71, Fenchurch Street, London, E.C. 3 (June, 1923).

London General Shipowners' Society: Chairman, Sir S. George Higgins, C.B.E.; Secretary, Douglas T. Garrett; Telephone, Avenue 7084: Address, 1, Fenchurch Avenue, London. E.C. 3 (July, 1923).

London Underwriters, The Institution of; Secretary, G. Morrison: Address, 1, St. Michael's House, Cornhill, London, E.C. 3.

Manchester District: Shipping Federation, Ltd.: Chairman, Major G. A. Renwick: Secretary, T. Whyman; Telephone, City 2060; Telegrams "Membership, Manchester": Address, 115, Corn Exchange Buildings, Manchester.

Manchester Marine Insurance Association: Chairman, John Speers; Vice-Chairman, J. Brockbank; Secretary, Geo. Lombers; Telephone, Central 1228: Address, Parr's Bank Buildings, 3, York Street, Manchester (January, 1923).

Manchester Steamship Owners' Association: Chairman, Major G. A. Renwick; Vice-Chairman, W. F. Merchant; Treasurer, H. Pyke; Hon. Secretary, T Whyman; Telephone, City 2060, Manchester; Telegrams, "Membership, Manchester": Address, 115, Corn Exchange Buildings, Manchester (February, 1923).

Marine Caterers' Guild, The: Address, 23, Dominion Buildings, 28, Brunswick Street, Liverpool.

Marine Engineers' Association, Ltd., The: President, W. Roberts; General Secretary, D. Bramah, C.B.E.; Telephone, Hop 1053; Telegrams, "Oarless Boroh, London": Head Office, London Bridge House, London Bridge, London, S.E. 1 (August, 1923).

Marine Society: President, The Rt. Hon. the Earl of Romney; Chairman, Captain Sir Arthur Clarke, K.B.E.; Treasurer, J. F. W. Deacon; Captain Superintendent, Commander B. O. F. Phibbs, R.N. (retd.); Secretary, Captain C. G. A. Lenny, R.N. (retd.); Assistant Secretary, John Foster, R.N.; Telephone, Central 13417; Telegrams, "Hanway, Stock, London": Address, Clark's Place, Bishopsgate, London, E.C. 2 (June, 1923).

Mercantile Marine Service Association, Inc., The: President, Captain J. H. Goodwin, M.B.E.; Vice-President, Captain G. C. M. Oakley; Deputy Vice-President, Captain H. Elliott; Hon. Treasurer, Gershom Stewart, M.P.; Secretary, Thos. Scott; Telephone, Central 690; Telegrams, "Topmast, Liverpool": Address, Tower Building, Water Street, Liverpool (May, 1923).

Mersey Branch: National Sailmaking Employers' Association: Secretary, G. Wm. Hart: Address, 78, Duke Street, Liverpool.

Mersey District: Shipping Federation, Ltd.: Secretary, F. D. McCann; Telephone, Central 807; Telegrams, "Nemesis, Liverpool": Address, 25, Water Street, Liverpool.

Mutual Marine Underwriting Association Ltd., The: Chairman, James Hardie; Manager, Walter Patterson, M.B.E., J.P.: Address, 94, Hope Street, Glasgow.

Missions to Seamen, The: President, Admiral The Hon. Sir E. R. Fremantle, G.C.B.; Secretary, Stuart C. Knox, M.A.: Address, 11, Buckingham Street, Strand, London, W.C. 2.

National Maritime Board. *See* British Mercantile Marine.

National Sailmaking Employers' Association: President, Wm. M. Rose; Vice-President, A. E. Nickles; Hon. Treasurer, Victor Wilson; Secretary, David M'Gill, Jr.: Telephone, Central 4535; Telegrams, "Sands, Glasgow": Address, 78, St. Vincent Street, Glasgow.

National Sailors' and Firemen's Union of Great Britain and Ireland: President, J. Havelock Wilson, C.H., C.B.E., M.P.; Treasurer, T. Chambers, C.B.E.; Secretary, E. Cathery, C.B.E.; Telephone, Hop 4006; Telegrams, "Searoving, Lamb, London": Head Office, St. George's Hall, Westminster Bridge Road, London, S.E. 1 (December, 1922).

Nautical Almanac Office, H.M.: Superintendent, P. H. Cowell, M.A., F.R.S.; Chief Assistant, B. F. Bawtree: Address, Royal Naval College, Greenwich, London, S.E. 10.

Nautical College, Pangbourne, Berkshire: Captain Superintendent, Commander A. F. G. Tracy, R.N. (retd.); Managers, Devitt and Moore's Ocean Training Ships, Ltd., 12, Fenchurch Street, London, E.C. 3.

Navy League, The: President, The Duke of Somerset; Chairman, V. Biscoe Tritton; Vice-Chairman, Admiral L. G. Tufnell, C.M.G.; Editor of *The Navy*, Lieut.-Com. J. N. Benbow, R.N.; Secretary, Rear-Admiral Ronald A. Hipwood: Address, 13, Victoria Street, London, S.W. 1.

Newcastle Protection and Indemnity Association: Chairman, Sir William J. Noble, Bt.; Manager, Jas. Ferguson: Address, 4, Queen Street, Newcastle-on-Tyne.

Newcastle War Risks Indemnity Association, Ltd.: Chairman, J. Walter Burnett; Manager, Jas. Ferguson: Address, 4, Queen Street, Newcastle-on-Tyne.

Newport District: Shipping Federation, Ltd.: Secretary, Griffith J. Jones; Telephone, Newport 2710; Telegrams, "Nemesis, Newport": Address, 119, Dock Street, Newport, Mon.

Newport Shipowners' Association: Chairman, Major Claude G. Martyn; Secretary, J. A. Evans: Address, 87, Dock Street, Newport, Mon.

North of England Protecting and Indemnity Association: Chairman, M. McNaughton Mein; Vice-Chairman, Sir William Seager, M.P.; Managers, J. Stanley Todd and Frederick Miller; Assistant Manager, S. M. Todd; Telephones, Central 5221-2-3; Telegrams, "Norprindem, Newcastle": Head Office, Collingwood Buildings, Newcastle-on-Tyne (February, 1923).

North of England Steamship Owners' Association: Chairman, E. R. Newbigin; Vice-Chairman, R. J. Thompson, J.P.; Hon. Treasurer, J. T. Lunn; Secretary, William T. Todd; Telephone, Central 1270; Telegrams, "Nemesis, Newcastle-on-Tyne": Address, 6, Sandhill, Newcastle-on-Tyne (March, 1923).

Officers' Association, The: Presidents, Earl Beatty, Earl Haig and Air-Marshal Sir H. M. Trenchard: Address, 48, Grosvenor Square, London, W. 1.

Plymouth District: Shipping Federation, Ltd.: Secretary, H. A. Clear; Telephone, Plymouth 54; Telegrams, "Nemesis, Plymouth": Address, 10, Military Road, Plymouth.

Register and Record Office of Shipping and Seamen. *See under* Board of Trade at bottom of page 510.

Registry of Business Names: Registrar, H. Birtles; Assistant Registrar, A. E. Campbell-Taylor, O.B.E.: Address, 3 and 4, Clement's Inn, London, W.C. 2.

Royal Corps of Naval Constructors: Director of Naval Construction, Sir Eustace H. Tennyson d'Eyncourt, K.C.B., F.R.S., D.Sc.; Director of Warship Production, W. J. Berry, C.B.; Deputy Director of Dockyards, E. A. J. Pearce, O.B.E. (Temporary).

Royal Merchant Seamen's Orphanage: Chairman, Sir Thos. L. Devitt, Bt.; Treasurer, The Rt. Hon. Lord Inchcape of Strathnaver, G.C.M.G., G.C.I.E., K.C.S.I.; Secretary, F. W. Rawlinson: Address, Dixon House, Lloyd's Avenue, London, E.C. 4 (March, 1923).

Royal Naval Benevolent Society: President, Admiral of the Fleet Lord Walter T. Kerr, G.C.B.; Secretary, Paymaster Captain Edward H. Shearme, C.B.E., R.N.: Address, 18, Adam Street, Adelphi, London, W.C. 2.

Royal National Lifeboat Institution: President, H.R.H. The Prince of Wales, K.G.; Chairman, The Rt. Hon. Earl Waldegrave; Deputy Chairman, Sir Godfrey Baring, Bt.; Secretary, G. F. Shee, M.A.; Telephone, 2161; Telegrams, "Lifeboat Institution, London": Address, 22, Charing Cross Road, London, W.C. 2 (April, 1923).

Royal United Service Institution: President, Field Marshal H.R.H. The Duke of Connaught, K.G.; Chairman of the Council, Lieut.-General Sir H. S. G. Miles, G.C.B., G.C.M.B., G.B.E., C.V.O.; Vice-Chairman, Admiral Sir R. G. O. Jupper, K.C.B., C.V.O.; Secretary, Lieut.-Colonel Sir A. Leetham, C.M.G., F.S.A.: Address, Whitehall, London, S.W. 1 (March, 1924).

Sailing Shipowners' Association: Chairman of the Executive Committee, J. W. Eason; Secretary, H. M. Cleminson: Address, 24, St. Mary Axe, London, E.C. 3.

Salvage Association, Inc., The: Chairman, P. G. Mackinnon; Deputy Chairman, F. Templeman; Secretary, Sir Joseph Lowrey, K.B.E.; Assistant Secretaries, F. C. Sadler and A. Muir Smith; Telegrams, "Wreckage, London": Address, 19, Birchin Lane, London, E.C. 3 (March, 1923).

Scottish Shipmasters' and Officers' Association, The: Now amalgamated with the Mercantile Marine Service Association, *q.v.*

Seamen's Hospital Society, "Dreadnought," The: President, Commander H.R.H. The Duke of York, K.G., G.C.V.O., R.N.; Treasurer, Colonel Sir R. Williams, Bt., M.P.; Secretary, Sir James Michelli, C.M.G.; Telephone, Greenwich 370: Address, Seamen's Hospital, Greenwich, London, S.E. 10.

Seamen's National Insurance Society: Chairman of Management Committee, Sir Norman Hill, Bt.; Treasurer, A. Barnes; Secretary, Sidney H. Godfrey: Address, 80, Leman Street, London, E.

Shipbuilding Employers' Federation, The: President, Leonard Ropner; Vice-Presidents, Grant Barclay, John Barr, C.B.E., and Sir Andrew R. Duncan: Secretary, Sir Chas. J. O. Sanders, K.B.E.; Assistant Secretary, A. Belch: Address, 9, Victoria Street, Westminster, London, S.W. 1 (October, 1923).

Ship Constructors' and Shipwrights' Association, The: Address, 8, Eldon Square, Newcastle-on-Tyne.

Shipping Federation, Ltd., The: President, Sir Thomas L. Devitt, Bt.; Chairman of Executive Council, Sir Shadforth Watts; Vice-Chairman Executive Council, F. C. Allen; General Manager, Cuthbert Laws; Secretary, Michael Brett; Telephones, London Wall 9878 and 9879; Telegrams, "Traffic, Phone, London": Chief Office, 24, St. Mary Axe, London, E.C. 3 (May, 1923).

Shipowners' Parliamentary Committee: Chairman, Hon. Alex. Shaw, M.P.; Vice-Chairman, Sir Thomas Royden, Bt., C.H., M.P.; Secretary, H. M. Cleminson: Address, 28, St. Mary Axe, London, E.C. 3 (February, 1923).

Soldiers', Sailors' and Airmen's Families' Association: Chairman, Lieut.-General The Hon. Sir Frederick W. Stopford, K.C.B., K.C.M.G., K.C.V.O.; Vice-Chairman, The Countess of March, C.B.E.; Hon. Treasurer, Major-General C.R.R. McGrigor, C.B., C.M.G.; Secretary and Organiser, Captain Sir George E. Wickham Legg, K.B.E., M.V.O.; Telephone, Victoria 396; Telegrams, "Gildea, Vic, London": Head Office, 23, Queen Anne's Gate, Westminster, London, S.W. 1.

Southampton District: Shipping Federation, Ltd.: Secretary, V. Harper; Telephone, Southampton 12; Telegrams, "Nemesis, Southampton": Address, 24, Canute Road, Southampton.

South of Ireland: District Shipping Federation, Ltd.: Secretary, R. G. Quirk; Telephone, Dublin 2129; Telegrams, "Federation, Dublin": Address, 23, Eden Quay, Dublin.

Standard Ship Owners' Mutual Freight, Dead Weight, Demurrage and Defence Association, Ltd., The: Chairman, Charles T. Milburn; Managers, Charles Taylor and Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steamship Owners' Mutual War Risks Association, Ltd., The: Chairman, Charles T. Milburn; Managers, Charles Taylor and Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steam Ship Owners' Protection and Indemnity Association, Ltd., The: Chairman, Charles T. Milburn; Managers, Charles Taylor & Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Suez, Compagnie Universelle du Canal Maritime de: President, C. Jonnart; Chairman of London Committee and Vice-President, Lord Inchcape, G.C.M.G., K.C.S.I., K.C.I.E.; Secretary, George E. Bonnet: Address, 3, Whittington Avenue, Leadenhall Street, London, E.C. 3.

Sunderland Shipowners' Society: President, Lord Durham; Chairman, Ernest F. Dix; Secretary, Chas. Booth: Address, 44, Frederick Street, Sunderland (March, 1923).

Swansea Chamber of Commerce and Shipping (Shipping Section): Chairman, J. Montgomery Williams; Vice-Chairman, Trevor Bowen; Secretary, Henry J. Marshall; Assistant Secretary, C. Leakey; Telephone, Central 18; Telegrams, "Commerce, Swansea": Address, Chamber of Commerce, Swansea (January, 1923).

Swansea District: Shipping Federation, Ltd.: Secretary, W. Turpin; Telephone, Swansea 744; Telegrams, "Nemesis, Swansea": Address, Gloucester House, Swansea.

Tees District: Shipping Federation, Ltd.: Secretary, B. O. Davies; Telephone, Middlesbro'-on-Tees 1161; Telegrams, "Nemesis, Middlesbro'-on-Tees": Address, Erimus Chambers, Middlesbro'-on-Tees.

Thames District: Shipping Federation, Ltd.: Secretary, G. Grinling Harris; Telephone, Avenue 3966; Telegrams, "Billboard, Phone, London": Address, Billiter Buildings, Billiter Street, E.C. 3.

Thames Nautical Training College: Chairman, The Rt. Hon. Lord Inchcape of Strathnaver, G.C.M.G., K.C.S.I., K.C.I.E.; Captain Superintendent, Captain M. B. Sayer, C.B.E., R.N.R.; Head Master, T. R. Beatty, M.A.; Secretary, F. H. Stafford: Address, 72, Mark Lane, London, E.C. 3.

Trinity House, The Honourable Corporation of: Master, Field-Marshal H.R.H. The Duke of Connaught, K.G.; Deputy-Master, Captain Sir H. Acton Blake, K.C.M.G., K.C.V.O.; Secretary, M. K. Smith, O.B.E.: Address, Tower Hill, London, E.C. 3.

Tyne and Blyth District: Shipping, Ltd.: Secretary, Wm. T. Todd; Telephone, Central 1270; Telegrams, "Nemesis, Newcastle-on-Tyne": Address, 6, Sandhill, Newcastle-on-Tyne.

Tyne, Wear and Tees Branch: National Sailmaking Employers' Association: Secretary, J. Campbell: Address, Sheepfold Sailworks, Sunderland.

Ulster District: Shipping Federation, Ltd.: Secretary, W. Chambers; Telephone, Belfast 3160; Telegrams, "Federation, Belfast": Address, 53, Waring Street, Belfast.

Underwriters and Insurance Brokers in Glasgow, Association of: Committee, John M. Lamont (Chairman), George Jackson, Robert Law, Hugh M. Parker, Charles G. Fulton, Richard Gibson, and Wm. Calderwood; Secretary and Treasurer, William Stewart: Address, Underwriters' Rooms, Royal Exchange Buildings, Glasgow.

United Kingdom Mutual Steamship Assurance Association, Ltd.: Chairman, Sir Walter Runciman, Bt.; Managers, T. R. Miller & Son; Telephone, Avenue 2552; Telegrams, "Mutuality, Stock, London": Address, 24, St. Mary Axe, London, E.C. 3 (March, 1923).

Wear and Seaham District: Shipping Federation, Ltd.: Secretary, J. G. Rutherford; Telephone, Sunderland 24; Telegrams, "Nemesis, Sunderland": Address, 45, West Sunniside, Sunderland.

West of England Steamship Owners' Protection and Indemnity Association, Ltd.: Chairman, Sir Shadforth Watts; Vice-Chairman, Sir John B. Wimble; Managers, John Holman & Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

LIST OF REPRESENTATIVE DOMINION AND FOREIGN SHIPBUILDING AND SHIPPING ASSOCIATIONS.

AUSTRALIA.

Australasian Steamship Owners' Federation: Address, Steamship Buildings, 509, Collins Street, Melbourne.

Australian Masters' and Officers' Guild: Address, Sydney.

United Service Institution of Australia, The: Address, Sydney, N.S.W.

BELGIUM.

International Shipping Federation, Ltd., The, (Belgian Branch): General Secretary, J. F. Drory: Address, 7, Quai Van Dyck, Antwerp.

Union des Armateurs Belges: Address, 6, Courte Rue des Claires, Antwerp.

CANADA.

American Association of Port Authorities: Address, Montreal.

Shipping Federation of Canada: Address, 218, Board of Trade Building, Montreal.

CHINA.

China Coastwise Association: Address, Hong Kong.

DENMARK.

Baltic and White Sea Conference: Address, 7, Toldbodvei, Copenhagen.

Dansk Dampskibsrederiforening: Address, St. Annae Plads 19, Copenhagen.

International Shipping Federation, Ltd. (Danish Branch): General Secretary, A. O. Andersen: Address, Amaliegade 22, Copenhagen.

FRANCE.

Bureau des Longitudes (Publishers of the French Nautical Almanac): Address, Palais de l'Institut, 3, Rue Mazarine, Paris.

Comité Central des Armateurs de France: Address, 73, Boulevard Hausmann, Paris.

The French Nautical Almanac. *See* Bureau des Longitudes.

GERMANY.

International Shipping Federation, Ltd., The, (German Branch): General Secretary, Dr. Paul Ehlers: Address, Adolphsbrucke 9, Hamburg.

Wirtschaftsausschuss der Deutschen Reederei: Address, Moncklbergstr. 27 II., Hamburg.

Zentralverein Deutscher Rheder: Address, Adolphsbrucke 9, Hamburg.

Holland.

International Shipping Federation, Ltd. (Dutch Branch): General Secretary, J. Stakenburg: Address, Willemsplein 8b, Rotterdam.

Nederlandsche Reedersvereeniging: Address, Stationsweg 135, The Hague.

India.

United Service Institution of India, The: Address, Simla.

Italy.

Federazione Armatori Italiani: Address, Via Cairoli 6, Genoa.

Federazione Armatori Liberi Italiani: Address, Salita S. Caterina 4, Genoa.

Japan.

Japanese Merchant Marine Officers' and Engineers' Association: Address, No. 180, 8 Chome, Shimoyamate—Dori, Kobe.

Shipowners' Association of Japan; Secretary, N. Ohtani: Address, c/o Nippon Yusen Kaisha, 4, Lloyd's Avenue, London, E.C. 3., England.

Norway.

Assuranceforening Skuld: Address, Carl Johansgt 1, Postbox 129, Christiania.

Nordisk Skibsrederiforening: Address, Christiania.

Norges Rederforbund: Address, Stortingsgt 16, Christiania.

Spain.

"Almanaque Nautico" (The Spanish Almanac). *See* Observatorio de Marina.

Asociacion de Navieros de Bilbao: Address, Bilbao.

Observatorio de Marina, El (Publishers of the Spanish Almanac, "Almanaque Nautico"); Director, Señor Leon Herrero: Address, San Fernando, Cadiz.

Sweden.

International Shipping Federation, Ltd., The (Swedish Branch): General Secretary, O. A. Nordburg: Address, Sveriges Redareforening, Gothenburg.

Sveriges Redareforening: Address, Gothenburg.

Sveriges Segelfartygsforening: Address, Ombudsmannen, Raa pr. Raus.

United States.

American Steamship Owners' Association: Address, 11, Broadway, New York.

American Steamship Owners' Mutual Protection and Indemnity Association: Address, 49 and 51, Wall Street, New York, N.Y.

Nautical Almanac: Superintendent of the Almanac, Captain Eichelberger, U.S.N.: Address, United States Observatory, Washington, D.C.

LIST OF PRINCIPAL BRITISH AND FOREIGN SHIPOWNERS.

(For particulars of the Steamship Services of the lines and firms given in this list see "The Principal Steamship Services of the World" on page 535.)

Adelaide Steamship Co., Ltd., Steamship Buildings, Currie St., Adelaide, South Australia; Yuills, Ltd., 120, Fenchurch St., London, E.C. 3.

Admiral Line, Perkins Building, Tacoma, Wash., and L.C. Building, Seattle, Wash., U.S.A.

African Steamship Co., 23, Billiter St., London, E.C. 3.

Alaska Steamship Co., Pier 2, Seattle, Wash., U.S.A.

Allan Line, 25, Bothwell St., Glasgow.

Amalgamated Industrials, Ltd., Head Office, Alexandra House, 9, Union Court, Old Broad St., London, E.C. 2. Associated Companies: G. Heyn and Sons, Ltd., *q.v.*, and the Cork Steamship Co., Ltd., *q.v.*

American-Hawaiian Steamship Co.: Managers, United American Lines, *q.v.*

American Line: Branch of White Star Line, *q.v.*

Anchor-Brocklebank and Well Lines: Owners, T. and J. Brocklebank, Ltd., *q.v.*

Anchor Line (Owners, Anchor Line (Henderson Brothers), Ltd., *q.v.*), 12 and 16, St. Vincent Place, Glasgow.

Anchor Line (Henderson Brothers), Ltd.: Head Office, Anchor Line Buildings, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.

Anderson, Green and Co., Ltd., Head Office, 5, Fenchurch Avenue, London, E.C. 3.

Anglo-American Oil Co., Ltd., 36, Queen Anne's Gate, Westminster, London, S.W. 1.

Anglo-Saxon Petroleum Co., Ltd., Head Office, St. Helen's Court, Leadenhall St., London, E.C. 3.

Asiatic Steam Navigation Co., Ltd, The : Managers, Turner and Co., *q.v.*
Atlantic, Gulf & West Indies Steamship Lines, 11, Broadway, New York, U.S.A.
Atlantic Transport Line: Branch of White Star Line, *q.v.*
Australasian United Steam Navigation Co., Ltd., 120, Leadenhall St., London, E.C. 3.
Australian Steamships Pty., Ltd., 35–45, Market St., Melbourne, and 33, Cornhill, London, E.C. 3.
Atlantic Line: Branch of White Star Line, *q.v.*
Atlantic Transport Line, 9, Broadway, New York, U.S.A., and 38, Leadenhall St., London. E.C. 3.
Bear Creek Oil and Shipping Co., Ltd. : Managers, C. Bowring & Co., Ltd., *q.v.*
Belfast Steamship Co., Ltd. : Head Office, 42 & 43, Donegal Quay, Belfast; Liverpool Office, Royal Liver Building ; London Office, 29, Cockspur St., S.W. 1.
Bell & Co., James, Bell Chambers, Paragon St., Hull.
Ben Line Steamers, Ltd. : Managing Owners, William Thompson & Co., *q.v.*
Bergenske Dampskibsselskab, Det, Head Office, Post Box 215, Bergen, Norway.
Bibby Line, 26, Chapel St., Liverpool, and 138, Font St., New York, U.S.A.
Black and Co., Ltd., John : Joint Managers with Donaldson Bros., Ltd., of Donaldson South American Line, *q.v.*
Bland Line (Managing Owners, M. H. Bland and Co., Ltd.), Cloister Building, Gibraltar; London agents, Watts, Watts and Co., Ltd., 7, Whittington Avenue, Leadenhall St., E.C. 3.
Blue Funnel Line: Managers, Alfred Holt & Co., *q.v.*
Blue Star Line, Ltd., Holland House, Bury St., London, E.C. 3.
Bombay Steam Navigation Co., Ltd., 120, Frere Road, Bombay.
Booth Line, Cunard Building, Liverpool, and 11, Adelphi Terrace, London, W.C. 2.
Bowring & Co., Ltd., C. T. : Head Office, 20, Castle St., Liverpool; London Office, Winchester House, Old Broad St., E.C. 3.
Bowring Steamship Co., Ltd. : Managers, C. T. Bowring & Co., Ltd., *q.v.*
British and African Steam Navigation Co., Ltd., Colonial House, Water St., Liverpool.
British and Argentine Steam Navigation Co., Ltd.: Associated Company of the Furness-Houlder Argentine Lines, Ltd., *q.v.*
British and Irish Steam Packet Co., Ltd., Head Office, 27, Sir John Rogerson's Quay, Dublin; London Office, 1, Seething Lane, E.C. 3.
British India Line: Owners, British India Steam Navigation Co., Ltd., *q.v.*
British India Steam Navigation Co., Ltd., Head Office, 122, Leadenhall St., London, E.C. 3; Agents in India: Mackinnon, MacKenzie & Co., Chief Office, Calcutta.
British Rhineland Navigation and Transport Co., Ltd.: Managers, Burton, Smart and Orford, Ltd., *q.v.*
British Tanker Co., Ltd., Salisbury House, London Wall, London, E.C. 2.
Brocklebank, Ltd., T. & J. (Anchor-Brocklebank & Well Lines), Cunard Building, Liverpool.
Brown Shipping Co. (Newcastle), Ltd., The : Managers, Robinson, Brown and Co., *q.v.*
Broström, Dan, 5, Packhusplatsen, Gothenberg, Sweden
Bull & Co., A. H., 40, West St., New York, U.S.A.
Burns Ltd., G. & J., Head Office, 30, Jamaica St., Glasgow.
Burns Steamship Co., Ltd., The: Managers, G. and J. Burns, Ltd., *q.v.*
Burton, Smart and Orford, Ltd., Head Office, 10 and 11, Lime St., London, E.C. 3.
Cairn Line of Steamships, Ltd. *See* Cairns, Noble & Co., Ltd.
Cairns, Noble & Co., Ltd., Head Office, Akenside House, Side, Newcastle-on-Tyne; London Office, 38, Great St. Helens, E.C. 3.
Camillo Tank Steamship Co., Ltd., The : Managers, C. T. Bowring and Co., Ltd., *q.v.*
Canada Steamship Lines, Ltd., 9–11, Victoria Square, Montreal.
Canadian Government Merchant Marine Ltd. : Head Office, 230, St. James St., Montreal; London Office, 17–19, Cockspur St., S.W. 1; New Zealand Office, Ferry Building, Quay St. Auckland.
Canadian Pacific Steamships, Ltd., Head Office, 8, Waterloo Place, Pall Mall, London, S.W. 1.
Canadian Pacific Railway Co.'s Ocean Steamship Line. *See* Canadian Pacific Steamships, Ltd.
Carlsson, G., Gothenberg, Sweden. *See* also Transatlantic S.S. Co., Ltd.
Cayzer, Irvine & Co., Ltd. : Head Office, 2, St. Mary Axe, London, E.C. 3.
Chambers & Co., James, 3 & 5, King St., Liverpool.
Chargeurs Réunis, Cie. Française de Navigation à Vapeur, 1, Boulevard Malesherbes, Paris.
Chellew, R. B., Exchange Buildings, Truro, Cornwall.
China Mutual Steam Navigation, Co., Ltd. (known as the Blue Funnel Line): Managers, Alfred Holt and Co., *q.v.*

China Navigation Co., Ltd., 8, Billiter Square, London, E.C. 3.
"City" Line: Head Office, 75, Bothwell, St., Glasgow; Liverpool Office, 22, Water St.; London Agents, Montgomerie and Workman (1920), Ltd., 104–106, Leadenhall St., E.C. 3. Owners of "City" Line, Ellerman's Lines, Ltd., *q.v.*
Clan Line Steamers, Ltd., The: Managing Owners, Cayzer Irvine & Co., *q.v.*
Clarke, Stephenson & Co., Head Office, 4, St. Dunstan's Alley, London, E.C. 3.
Cleveland Cliffs Iron Co., 11th Floor, Kirby Building, Cleveland, Ohio, U.S.A.
Clyde Shipping Co., Ltd., 21, Carlton Place, Glasgow, and 138, Leadenhall St., London, E.C. 3.
Clyde Steamship Co.: Head Office, Pier 36, North River, New York, U.S.A; London Agents, Simpson, Spence & Young.
Coast Lines, Ltd.: Head Office, Royal Liver Building, Liverpool; London Office, Seething Lane, E.C. 3.
Commonwealth & Dominion Line, Ltd., 9 & 11, Fenchurch Avenue, London, E.C. 3.
Commonwealth Government Line of Steamers: Head Office in England, Australia House, Strand, London, W.C. 2; Head Office in Australia, 447–451, Collins St., Melbourne.
Compagnie Générale Transatlantique, 6, Rue Auber, Paris, and 4, Lloyd's Avenue, London, E.C. 3.
Compagnie Havraise Péninsulaire de Navigation à Vapeur; Head Office, 10, Rue de Châteaudun, Paris; London Agents, Thomas and Son, 26, Billiter St., E.C. 3.
Companhia Commercio e Navegação, 37, Avenida Rio Branco (Caixa 482), Rio de Janeiro, Brazil.
Companhia Nacional de Navegação Costeira, 23, Rua do Hospicio, Rio de Janeiro, Brazil.
Compañia Transatlantica, Cadiz, Spain.
Compañia Trasmediterránea, Head Office, Comedias, 20, Valencia, Spain; London Office, 20, Copthall Avenue, E.C.
Cork Steamship Co., Ltd., Alexandra House, 9, Union Court, Old Broad St, London, E.C. 2.
Cornborough Shipping Line, Ltd., The: Managing Owners, Sir William Reardon Smith and Sons., Ltd., *q.v.*
Cory Colliers, Ltd., 52, Mark Lane, London, E.C. 3.
Cory & Sons, Ltd., John, Mount Stuart House, Cardiff: London Agents, Ockenden & Son, 4, St. Mary Axe, E.C. 3.
Cunard Line: Owners, Cunard Steam Ship Co., Ltd., *q.v.*
Cunard Steam Ship Co., Ltd.: Head Office, Cunard Building, Pier Head, Liverpool; London Office, 51, Bishopsgate.
Currie Line: Owners, The Leith Hull and Hamburg Steam Packet Co., Ltd.; Managers, James Currie & Co., *q.v.*
Currie & Co., James: Head Office, 16, Bernard St., Leith.
Dalgliesh, Ltd., R. S.: Head Office, Watergate Buildings, Sandhill, Newcastle-on-Tyne; London Office, 22, Billiter St., E.C. 3.
Dalgliesh Steam Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*
Dampskibsactieselskabet Otto Thoresens Linie, Prinsengade 1, Christiania.
Denmark State Railways (De Danske Statsbaner), Trommesalen, 5, Copenhagen, B., Denmark.
Det forenede Dampskibs-Selskab Aktieselskab: Head Office, Kvœsthusgade 7 and 9B, Copenhagen, K., Denmark; London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Devon Shipping Co., Ltd.: Managing Owners, Harrison, Sons and Co., Ltd., *q.v.*
Dominion Line: purchased by Frederick Leyland and Co., Ltd., *q.v.*
Donaldson Bros., Ltd., Joint Managers with John Black and Co., Ltd., of Donaldson South American Line, Ltd., *q.v.*
"Donaldson" Line, Ltd.: Head Office, 14, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.
Donaldson South American Line, Ltd.: Head Office, 14, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.
Eagle Oil Transport Co., Ltd., 16, Finsbury Circus, London, E.C. 2.
East Asiatic Co., Ltd. (United Baltic Corp., Ltd., 158, Fenchurch St., London, E.C. 3), 2, Holbergsgade, Copenhagen, Denmark.
Elder Dempster & Co., Ltd., Colonial House, Water St., Liverpool, and 4, St. Mary Axe, London, E.C. 3.
Elders and Fyffes, Ltd., 31 and 32, Bow St., Covent Garden, London, W.C. 2.
Ellerman & Bucknall Steamship Co., Ltd., 104–106, Leadenhall St., London, E.C. 3.
Ellerman's "City" and "Hall" Lines. *See* City Line; and Hall Line.
Ellerman Lines, Ltd.: Head Office, 22, Water St., Liverpool; London Office, 12, Moorgate St., E.C. 2.

Ellerman's Wilson Line, Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Federal Steam Navigation Co., Ltd., 2, Fenchurch Avenue, London, E.C. 3.
Fenwick, France, & Co., Ltd., Wm.: Head Office, 5, Fenchurch St., London, E.C. 3.
Finland Line Helsingfors, Finland: Chas. Gee & Co., 17, Gracechurch St., London, E.C. 3.
Fisher, Alimonda & Co., Ltd., 110, Fenchurch St., London, E.C. 3.
France, Fenwick & Co., Ltd., Wm., 5, Fenchurch St., London, E.C. 3.
Furness-Houlder Argentine Lines, Ltd.: Head Office, 53, Leadenhall St., London, E.C. 3; Liverpool Office, 201, Royal Liver Building.
Furness Line: Owners, Furness, Withy and Co., Ltd., *q.v.*
Furness-Prince Line: Owners, Furness, Withy and Co., Ltd., *q.v.*
Furness, Withy & Co., Ltd., Furness House, Billiter St., London, E.C. 3.
General Steam Navigation Co., Ltd.: Head Office, 15, Trinity Square, London, E.C. 3.
Gilwen Shipping Co., Ltd.: Managing Owners, Harrison, Sons and Co., Ltd., *q.v.*
Glasgow and Highland Royal Mail Steamers: Owners, David MacBrayne, Ltd., *q.v.*
Glasgow United Shipping Co., Ltd.: Managing Owners, Maclay and McIntyre, *q.v.*
Glen Line, Ltd.: Head Office, 1, East India Avenue, London, E.C. 3.
Glen and Shire Lines: Owners, Glen Line, Ltd., *q.v.*
Gould Steamship and Industrials, Ltd.: Head Office, Merthyr House, Cardiff; London Agents, J. C. Gould, Angier and Co., Ltd., Ethelburga House, Bishopsgate, E.C.
Gow, Harrison & Co., 8, Gordon St., Glasgow.
Grace & Co., W. R.: Head Office, 10, Hanover Square, New York, U.S.A.; Associated Company and Agents, Grace Brothers, Ltd., 144, Leadenhall Street, London, E.C.3.
Green Star Steamship Corporation, 24, State Street, New York, U.S.A.
Hain Steamship Co., Ltd., St. Ives, Cornwall; London Agents, Foster, Hain and Read, Ltd., 24 St Mary Axe, E.C. 3.
Hall Bros., Steamship Co., Ltd., Royal Arcade, Newcastle-on-Tyne.
Hall Line, Ltd.: Head Office, Tower Building, Water St., Liverpool; London Office, Hall Line Agency, 104–106, Leadenhall Street, E.C. 3. (Owners, The Ellermann Lines, Ltd.)
Hamburg-Amerika Line. *See* Hamburg-Amerikanische Packetfahrt.
Hamburg-Amerikanische Packetfahrt Aktien-Gesellschaft, Alsterdamm 25; and Ferdinandstrasse 58/62, Hamburg, Germany.
Hansen, C. K., 15, Toldbodvejen, Copenhagen, Denmark.
Harrison Line: Owners, Thos. and Jas. Harrison, *q.v.*
Harrison, Thos. and Jas.: Head Office, Mersey Chambers, Old Churchyard, Liverpool; London Office, Dock House, Billiter Street, E.C. 3.
Harrison, Sons & Co., Ltd.: Head Office, Dowlais Chambers, Cardiff; London Agents, H. G. Harper and Co., 14, St. Mary Axe, E.C. 3.
"Head" Line & "Lord" Line: Managing Owners, G. Heyn and Sons, Ltd., *q.v.*
Henderson and Co., P., P.O. Box, 72,153, St. Vincent Street, Glasgow; London Agents, Galbraith, Pembroke and Co., 34, Leadenhall Street, E.C. 3.
Henderson Line: Owners, Henderson & Co., P.
Heyn and Sons, Ltd., G.: Head Office, Head Line Buildings, Victoria St., Belfast; Associated Company, Amalgamated Industrials, Ltd., Alexandra House, 9, Union Court, Old Broad Street, London, E.C. 2.
Hogarth & Sons, H., 24, St. Enoch Square, Glasgow.
Holland-Amerika Lijn (Nederlandsch-Amerikaansche Stoomvaat-Maatschappij): Head Office, Rotterdam, Holland; London Agents, The International Navigation Co., Ltd., 1 Cockspur Street, S.W. 1. (Passenger); and Phs. van Ommeren (London) Ltd. (Freight).
Holt & Co., Alfred: Head Office, India Buildings, Water St., Liverpool; London Agents, John Swire and Sons, 8 Billiter Square, E.C. 3; and Geo. Wills and Sons, Ltd. (for Australian Passenger Steamers only).
Houlder Brothers & Co., Ltd.: Head Office, 53, Leadenhall St., London, E.C. 3.
Houston Lines: Owners, R. P. Houston & Co., *q.v.*
Houston and Co., R. P.: Head Office, 10, Dale Street, Liverpool; London Office, 16, Leadenhall Street, E.C. 3.
Huddart, Parker, Ltd., 466, Collins St., Melbourne, and 101, Leadenhall St., London, E.C. 3.
Hull Steam Navigation Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*
Indo-China Steam Navigation Co., Ltd., Hong Kong and 3, Lombard St., London, E.C. 3.
Instone & Co., Ltd., S., Baltic House, Docks, Cardiff, and 22, Billiter St., London, E.C. 3.
International Navigation Co., Ltd.: Branch of White Star Line, *q.v.*

"Janeta" Steamship Co., Ltd.: Owners, Maclay and McIntyre, *q.v.*
Java-China-Japan Lijn: Head Office, Prins Hendrikkade 34, Amsterdam, Holland; London Agents, Keller Bryant and Co., 115-117, Cannon Street, E.C. 4.
Johnson, Axel Axelson, Stockholm, Sweden.
Johnson Line: Owners, Furness, Withy and Co., Ltd., *q.v.*
Johnston Line, Ltd.: Head Office, Royal Liver Building, Liverpool; London Office, 6, Billiter St., E.C.3.
Kawasaki Dockyard Co., Ltd., Kobe, Japan.
Kerr Steamship Co., Inc.: Head Office, New York; London Associated Company, R. S. Dalgliesh, Ltd., *q.v.*
Koninklijke Hollandsche Lloyd: Head Office, Prins Hendrikkade, Amsterdam, Holland; London Agents, Wainwright Bros. and Co, 21, Fenchurch Street, E.C.3 (General); and D. H. Drakeford, 60, Haymarket, S.W. 1 (Passenger Agent).
Koninklijke Nederlandsche Stoomboot Maatschappij (Royal Nederlands Steamship Co.), Scheepvaarthuis, Prins Hendrikkade 108-114, Amsterdam, Holland.
Koninklijke Paketvaart Maatschappij (Royal Packet Navigation Co.), 112-114, Prins Hendrikkade, Amsterdam, Holland; London Agents, Keller, Bryant & Co., 115-117, Cannon Street, E.C. 3.
Koninklijke West-Indische Maildienst (Royal Nederlands West India Mail): Head Office, Prins Hendrikkade, 108-114, Amsterdam, Holland; London Agents, Phs. van Ommeren (London) Ltd., 27, Leadenhall, Street, E.C. 3.
Laird Line, Ltd.: Head Office, 52, Robertson Street, Glasgow; London Office, 29, Cockspur Street, S.W. 1.
Lamport & Holt, Ltd., Royal Liver Building, Pier Head, Liverpool.
Lang & Fulton, Ltd.: Head Office, 1, Cathcart Street, Greenock; London Agents, James Foulton and Co., 3 and 4, Lime Street Square, E.C. 3.
Larrinaga & Co., Ltd.: Head Office, 30, James St., Liverpool; London Agents, Wainwright Bros. and Co., 21 Fenchurch Street, London, E.C. 3.
Leeds Shipping Co., Ltd.: Managing Owners, Sir W. R. Smith and Sons, Ltd., *q.v.*
Leith, Hull & Hamburg Steam Packet Co., Ltd., The: Managers, James Currie and Co., *q.v.*
Leyland Line: Owners, Frederick Leyland and Co., Ltd., *q.v.*
Leyland and Co., Ltd., Frederick: Head Office, 27 and 29, James Street, Liverpool; London Offices, 38, Leadenhall Street, E.C.; and 1, Cockspur Street, S.W. 1.
"Livingstonia" Steamship Co., Ltd.: Managing Owners, Maclay and McIntyre, *q.v.*
Lloyd Brazileiro, Praça Servulo Dourado, Rio de Janeiro, Brazil.
Lloyd Royal Belge (Great Britain), Ltd., 101, Leadenhall St., London, E.C. 3.
Lloyd Sabaudo, Società Anonima per Azioni: Head Office, 5, Via Stottoripa, Genoa, Italy.
Lloyd Triestino, Società di Navigazione a Vapore: Head Office, Trieste, Italy; London Agents, Italian State Railways, Waterloo Place, Regent Street, S.W. 1 (Passengers); and Fisher, Alimarda and Co., Ltd., 110, Fenchurch Street, E.C. 3 (Freight).
"Lord" Line ("Head" Line and "Lord" Line): Managing Owners, G. Heyn and Sons, Ltd., *q.v.* *See* "Head" Line.
Mac-Andrews & Co., Ltd.: Head Office, "Goree," Water Street, Liverpool; London Office, Suffolk House, Laurence Pountney Hill, E.C. 4.
MacBrayne, Ltd., David, 119, Hope St., Glasgow.
Maclay & McIntyre, 21, Bothwell St., Glasgow.
"Magdala" Steamship Co., Ltd: Managing Owners, Maclay and McIntyre.
Mallory Steamship Co.: Head Office, Pier 36, North River, New York, U.S.A.; London Agents, Simpson, Spence and Young.
Manchester Liners, Ltd., 108, Deansgate, Manchester.
McIlwraith, McEacharn's Line (Proprietary), Ltd., Scottish House, 94-96, William St., Melbourne, Victoria, and Billiter Square Buildings, London, E.C. 3.
Messageries Maritimes, Cie. des: Head Office, 9, Rue de Sèze, Paris (9e); London Office, 72-75, Fenchurch St., E.C. 3.
Mitsui Bussan Kaisha, Ltd. (Mitsui & Co., Ltd.), 1, Surugacho, Nihonbashi-Ku, Tokyo, Japan.
"Mombassa" Steamship Co., Ltd.: Managing Owners, Maclay and MacIntyre, *q.v.*
Moss & Co., H. E., 18, Chapel St., Liverpool, and 43, St. Mary Axe, London, E.C. 3.
Moss and Co., Ltd., James: Managers of Moss Steamship Co., Ltd., *q.v.*
Moss Steamship Co., Ltd.: Head Office, 31, James St., Liverpool; London Agents, Moxon Salt and Co., Ltd., 101, Leadenhall Street, E.C. 3.
Navigazione Generale Italiana: Head Office, 6, Via Balbi, Genoa; London Agents, Italian State Railways, 12, Waterloo Place, Regent St., London, S.W. 1 (for Passengers); and Farina, Galliano, Brizzolesi and Co., 11, Bury Street, London, E.C. 3 (for Freights).
"Nederland" Stoomvaart Maatschappij. *See* Stoomvaart Maatschappij Nederland.

Nederlansh-Amerikaansche Stoomvaart-Maatschappij. *See* Holland-Amerika Lijn.
Nelson, Ltd., H. & W.: Head Office, 98, Leadenhall St., London, E.C. 3; Liverpool Office, 20, Water St.
Nelson Line (Liverpool) Ltd.: Owners, H. and W. Nelson, Ltd., *q.v.*
Nelson Steam Navigation Co.: Owners, H. and W. Nelson, Ltd., *q.v.*
Neptune Line: Managers, Burton, Smart and Orford, Ltd., *q.v.*
New York & Cuba Mail S.S. Co. (Ward Line), Foot of Wall St., New York, U.S.A.
New York, Newfoundland and Halifax Steamship Co., Ltd.: Managers, C. T. Bowing and Co., Ltd., *q.v.*
New York & Porto Rico Steamship Co.: Head Office, 11, Broadway, New York, U.S.A.; London Agents, Harris and Dixon, Ltd., 81, Fenchurch St., E.C. 3.
New Zealand Shipping Co., Ltd., Wellington, N.Z., and 138, Leadenhall St., London, E.C. 3.
Nippon Yusen Kabushiki Kaisha (Japan Mail Steamship Co., Ltd.), 1, Yurakucho Itchome, Kojimachi-Ku, Tokyo, Japan, and Coronation House, Lloyd's Avenue, London, E.C. 3.
Nisshin Kisen Kabushiki Kaisha (Japan-China Steamship Co., Ltd.), 1, Yurakucho Itchome, Kojimachi-Ku, Tokyo, Japan.
Norddeutscher Lloyd, Bremen, Germany.
Nordenfjeldske Dampskibs-Selskab, Det. Trondhjem, Norway.
Norske Amerika Linie A/S., Den, Strandgaten 1, Christiania, Norway.
North Coast Steam Navigation Co., Ltd., 3, Sussex St. North, Sydney, N.S.W.
Northern Navigation Co., Ltd.: Managing Owners, Canada Steamship Lines, Ltd., *q.v.*
Oakwin Steamship Co., Ltd.: Managing Owners, Sir W. R. Smith and Sons, Ltd., *q.v.*
Ocean Steamship Co., Ltd.: Managers, Alfred Holt and Co., *q.v.*
Oceanic Steam Navigation Co., Ltd., Owners of White Star Line, *q.v.*
Oil Tank Steamship Co., Ltd.: Managers, C. T. Bowing and Co., Ltd., *q.v.*
Orient Line to Australia: Managers, Anderson, Green and Co., Ltd., *q.v.*
Osaka Shosen Kabushiki Kaisha, 64, Tomijimacho, Kitaku, Osaka, Japan.
Pacific Steam Navigation Co., Inc.: Head Office, Goree, Water St., Liverpool; London Office, 18, Moorgate St., E.C. 2.
Pacific Steamship Co., L. C. Smith Building, Seattle, U.S.A.
Pan American Petroleum & Transport Co.: Head Office, 1015, Security Building, Los Angeles, Cal., U.S.A.: New York Office, 120, Broadway.
Panama Railroad Co., 24, State St., New York, U.S.A.
Pelton Steamship Co., Ltd.: Head Office, Milburn House, Newcastle-on-Tyne; London Office, 29, Lombard St., E.C. 3.
Peninsular & Oriental Steam Navigation Co., Inc., 122, Leadenhall St., London, E.C. 3.
P. & O. Branch Service, 32, Lime St., London, E.C. 3.
Petersen & Co., Ltd., 6, Lloyd's Ave., London, E.C. 3.
Petrograd Steamers, Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Philadelphia Transatlantic Line: Owners, Furness, Withy & Co., Ltd., *q.v.*
Pinillos, Irzquierdo & Co., Plaza San Augustin, 2, Cadiz, Spain.
Pollock, Sons & Co., Ltd., Sir James, 3, Lloyd's Avenue, London, E.C. 3.
Pool Shipping Co., Ltd.: Managers, Sir A. Ropner & Co., Ltd., *q.v.*
Porto Rico Line: Managers, New York and Porto Rico Steamship Co., *q.v.*
Prince Line, Ltd., 12, Leadenhall St., London, E.C. 3.
Radcliffe & Co., Evan Thomas, Baltic House, Cardiff.
Raeburn & Vérel, Ltd., 45, West Nile St., Glasgow.
Rederiaktiebolaget Transatlantic. *See* Transatlantic Steamship Co., Ltd.
Red Star Line (Société Anonyme de Navigation Belge Américaine): Head Office, 22, Rue des Peignes, Antwerp; London Office, 1, Cockspur St., Westminster, S.W. 1.
Regis Shipping Co., Ltd.: Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Ridley, Son & Tully, John, Milburn House, Newcastle-on-Tyne.
Rio Cape Line, Ltd. (Owners: Furness, Withy & Co., Ltd.), 12, Leadenhall St., London, E.C. 3.
Robert Stanley Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*
Robertson, Wm., 45, West Nile St., Glasgow.
Robinson, Brown & Co.: Head Office, Custom House Chambers, Newcastle-on-Tyne.
Ropner & Co., Ltd., Sir R.: Head Office, Mercantile Chambers, Mainsforth Terrace, West Hartlepool; London Office, 22, St. Mary Axe, E.C. 3; Cardiff Office, Exchange Buildings, Mount Stuart Square.
Ropner Shipping Co., Ltd.: Managers, Sir R. Ropner & Co., Ltd., *q.v.*
Rotterdam-South America Line (Rotterdam-Zuid Amerika Lijn): Managers, Van Nievelt, Goudriaan & Co.'s Stoomvaart Maatschappij, *q.v.*

Royal Mail Steam Packet Co., The: Head Office, Royal Mail House, Moorgate, London, E.C. 2.
Russian Volunteer Fleet, Hovaghimian Han, Galatea: The Borneo Co. Ltd., 28, Fenchurch St., London, E.C. 3.
Ruys & Zonen, Wm., Veerhaven, 7, Rotterdam, Holland.
St. Just Steamship Co., Ltd.: Managing Owners, Sir W. R. Smith & Sons, Ltd., *q.v.*
Salvesen & Co., Ch. R.: Head Office, 29, Bernard St., Leith.
Scadia Lines: Managers, Burton, Smart & Orford, Ltd., *q.v.*
Shaw, Savill & Albion Co., Ltd.: Head Office, 34, Leadenhall St., London, E.C. 3.
Sheaf Steam Shipping Co., Ltd.: Managing Owners, W. A. Souter & Co., Ltd., *q.v.*
Shire Line, Glen Line and; Joint Service: Owners, Glen Line, Ltd., *q.v.*
Smart's Continental Lines: Managers, Burton, Smart and Orford, Ltd., *q.v.*
Smith & Sons, Ltd., Sir William Reardon: Head Office, Merthyr House, James St., Cardiff; London Office, 28, St. Mary Axe, E.C. 3.
Società di Navigazione "Sicilia": Head Office, Via del Giardino 76, Rome, Italy.
Società Italiana di Servizi Marittimi, Piazza Venezia 11, Rome, Italy.
Société Anonyme de Navigation Belge Américaine. *See* Red Star Line.
Société Générale d'Armement, 1, Place Graslin, Nantes, France.
Société Générale de Transports Maritimes à Vapeur: Head Office, 5 Rue de Surène, Paris (8e), France; London Agents, H. E. Moss & Co., 43, St. Mary Axe, E.C. 3.
Société "Les Affréteurs Réunis": Head Office, 15 Rue Scribe, Paris, France; London Office, Sussex House, 88A, Leadenhall St., E.C. 3.
Société Navale de l'Ouest: Head Office, 8, Rue Auber, Paris (9); London Agents, Langstaff, Ehrenberg and Pollak, Leadenhall Buildings, E.C. 3; and The Anglo-Guinea Produce Co., Ltd., 33–35, Eastcheap, E.C. 3.
Sota and Aznar: Head Office, Bilbao, Spain; London Office, 1, Lloyd's Avenue, E.C. 3.
Souter & Co., Ltd., W. A.: Head Office, Akenside House, Akenside Hill, Newcastle-on-Tyne.
Southern Pacific Co., Atlantic Steamship Lines, 165, Broadway, New York, U.S.A.
Stern, J. (Société des Affrêteurs Réunis), 15, Rue Scribe, Paris.
Stockholms Rederiaktiebolag Svea., Skeppsbron 30, Stockholm, Sweden.
Stoomvaart Maatschappij "Nederland": Head Office, 108–114, Prins Hendrikkade, Amsterdam, Holland; London Agents, Keller, Bryant & Co., 115–117, Cannon St., E.C. 4 (General); and D. H. Drakeford, 60, Haymarket, S.W. 1 (Passenger).
Straits Steamship Co., Ltd., St. Helen's Court, Collyer Quay, Singapore.
Strick & Co., Ltd., Frank C., Baltic House, Leadenhall St., London, E.C. 3.
Sun Shipping Co., Ltd.: Head Office, 57, Bishopsgate, E.C. 2; 8, St. Helen's Place, London, E.C. 2.
"T" Steam Coasters, Ltd.: Managers, Robinson, Brown & Co., *q.v.*
Tatsuuma Kisen Kabushiki Kaisha (Tatsuuma Steamship Co.), Nishinomiya, near Kobe, Japan.
Thomson & Co., William: Head Office, 28, Bernard St., Leith; London Agents, Killick, Martin & Co., 7, Fen Court, Fenchurch St., E.C. 3; and Galbraith, Pembroke & Co., 34, Leadenhall St., E.C. 3.
Town Line (London), Ltd.: Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Town Line Shipping Co., Ltd.: Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Toyo Kisen Kabushiki Kaisha (Oriental Steamship Co., Ltd.), No. 1, 1-chome Eirakucho, Kojimachi-Ku, Tokyo, Japan.
Transatlantic Steamship Co., Ltd.: Head Office, Gothenburg, Sweden; London Agents, J. E. Hyde, 1, Lime St. Square, E.C. 3.
"Transocèanic" Societa Italiana di Navigazione, Naples, Italy.
Transport Co., Ltd., 8–11, Lime St., London, E.C. 3.
Turner, Brightman & Co., 8 & 9, Great St. Helens, London, E.C. 3.
Turner & Co.: Head Office, 45, St. Mary Axe, London, E.C. 3.
Ulster Steamship Co., Ltd.: Managing Owners, G. Heyn & Sons, Ltd., *q.v.*
Unér Aktiebolag, H., Norrköping, Sweden.
Union-Castle Line (Owners, The Union-Castle Mail Steamship Co., Ltd.): Head Office, 3, Fenchurch St., London, E.C. 3.
Union Steam Ship Co. of New Zealand, Ltd., Dunedin, N.Z., and 138, Leadenhall St., London, E.C. 3.
United American Lines (Inc.): Head Office, 39, Broadway, New York, U.S.A.; London Agents, E. H. Mundy & Co., Seething Lane, E.C.
United States Steel Products Co.: Head Office, 30, Church St., New York, U.S.A.; London Agents, Isthmian Steamship Co., Ltd., 138, Leadenhall St., E.C. 3.
United States Transport Co., Inc., 50, Broad St., New York, U.S.A.
Van Nievelt, Goudriaan & Co.'s, Stoomvaart Maatschappij, N.V.: Veerhaven, 2, Rotterdam, Holland.
Van Ommeren, Phs.: Head Office, Westerlaan, 10, Rotterdam, Holland; London Office, Baltic House, 27, Leadenhall St., E.C. 3.

Virginia Line: Furness, Withy & Co., Ltd., *q.v.*
Walford Lines, Ltd.: Owners, Walford (London) Ltd., Leopold, *q.v.*
Walford (London) Ltd., Leopold: 29, Great St. Helens, London, E.C. 3.
Watergate Steam Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*
Watts, Watts & Co., Ltd., 7, Whittington Avenue, Leadenhall St., London, E.C. 3.
Weir & Co., Andrew, Baltic Exchange Buildings, 19, 20, 21, Bury St., London, E.C. 3.
Westall, James, 13, John St., Sunderland.
White Star-Dominion Line: Branch of White Star Line, *q.v.*
White Star Line: Head Office, 30, James St., Liverpool; London Office, 1, Cockspur St., S.W. 1.
Wilhelmsen, Wilh., Christiania, Norway.
Wilson and North-Eastern Railway Shipping Co., Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Wilson Transit Co., 948, Kirby Building, Cleveland, Ohio, U.S.A.
Witherington & Everett, Exchange Buildings, Quayside, Newcastle-on-Tyne.
Ybarra & Co., Calle San Jose 5, Seville, Spain.

LIST OF THE PRINCIPAL BRITISH SHIPBUILDERS, MARINE ENGINEERS, AND REPAIRERS.

(*Showing in parentheses after their names the output of each for* 1921.)

Abdella and Mitchell, Ltd., I. J., Brinscombe (7 vessels, 107 tons, 2810 I.H.P.).; Queensferry (7 vessels, 1476 tons, 1580 I.H.P.); total for two yards (14 vessels, 1583 tons, 4390 I.H.P).
Ailsa Shipbuilding Co., Ltd., Troon and Ayr (5 vessels, 9507 tons, 8300 I.H.P.).
Aitchison, Blair, Ltd., Clydebank, N.B. (4760 I.H.P.).
Alley and MacLellan, Glasgow (20 vessels, 2970 tons).
Amble Shipbuilding Co., Hebburn-on-Tyne (5 vessels, 1303 tons).
Amos and Smith, Ltd., Hull (550 I.H.P.).
Ardrossan Dry Dock and Shipbuilding Co., Ltd., Ardrossan, N.B. (8 vessels, 16,185 tons).
Armstrong, Whitworth and Co., Ltd., Sir W. G., Newcastle-on-Tyne (14 vessels 98,390 tons, 22,600 I.H.P.).
Austin, S. P., and Co., Ltd., Sunderland (3 vessels, 6892 tons).
Ayrshire Dockyard Co., Ltd., Irvine (3 vessels, 18,313 tons).
Babcock and Wilcox, Ltd., Glasgow (52,500 I.H.P.).
Barclay, Curle and Co., Ltd., Whiteinch and Glasgow (6 vessels, 52,648 tons, 33,500 I.H.P.).
Bartram and Sons, Ltd., Sunderland (1 vessel, 5048 tons).
Beardmore, W. and Co., Ltd., Glasgow and Dalmuir (7 vessels, 60,179 tons, 52,135 I.H.P).
Bergius Launch and Engine Co., Glasgow (10,020 I.H.P.).
Blair and Co., Ltd., Stockton-on-Tees (31,300 I.H.P.).
Blumer, J. and Co., Sunderland (1 vessel, 3198 tons).
Blyth Shipbuilding and Dry Dock Co., Ltd., Blyth (4 vessels, 12,274 tons).
Blythswood Shipbuilding Co., Scotstoun (1 vessel, 7000 tons).
Bow, M'Lachlan and Co., Ltd., Paisley (18 vessels, 7835 tons, 10,230 I.H.P.).
British Thomson-Houston Co., Rugby (10,500 I.H.P.).
Brown, George and Co., Greenock (2 vessels, 824 tons).
Brown, John and Co., Ltd., Clydebank (3 vessels, 44,920 tons, 28,000 I.H.P.).
Burntisland Shipbuilding Co., Ltd., Burntisland (2 vessels, 8376 tons).
Caird and Co., Ltd., Greenock. *See* Harland and Wolff, Greenock.
Caledon Shipbuilding and Engineering Co., Ltd., Dundee (5 vessels, 14,458 tons, 8050 I.H P.).
Cammell Laird and Co., Ltd., Birkenhead (5 vessels, 37,516 tons, 88,920 I.H.P.).
Campbell and Calderwood, Ltd., Paisley, N.B. (1875 I.H.P.).
Campbeltown Shipbuilding Co., Ltd., Campbeltown (2 vessels, 4850 tons).
Camper and Nicholsons, Ltd., Southampton (7 vessels, 1216 tons).
Clark, Geo., Ltd., Sunderland (14,210 I.H.P.).
Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow (1 vessel, 4893 tons, 5100 I.H.P.).

Coaster Construction Co., Montrose (8 vessels, 3490 tons).
Cockrane and Sons, Ltd., Selby, Yorks (5 vessels, 556 tons).
Connell, Chas. and Co., Ltd., Glasgow (3 vessels, 17,974 tons).
Cook, Welton and Gemmell. Ltd., Beverley and Hull, Yorks (6 vessels, 2137 tons).
Cooper and Greig, Dundee (9200 I.H.P.).
Crabtree and Co., Yarmouth (2 vessels, 706 tons, 809 I.H.P.).
Craig, Taylor and Co., Ltd., Stockton-on-Tees (3 vessels, 15,403 tons).
Cran and Somerville, J., Leith (4 vessels, 2091 tons, 2000 I.H.P.).
Crighton and Co., Ltd., Chester (25 vessels, 3292 tons).
Crown, John and Sons, Ltd., Sunderland (1 vessel, 2021 tons).
Cumming, D. M., Glasgow (5 vessels, 611 tons).
Day, Summers and Co., Ltd., Southampton (2 vessels, 899 tons, 2973 I.H.P.).
Denny, Wm. and Brothers, Ltd., Dumbarton (10 vessels, 22,939 tons 45,200 I.H.P.).
Dickinson, J. and Sons, Ltd., Sunderland (13,058 I.H.P.).
Dixon, Sir R. and Co., Ltd., Middlesbrough-on-Tees (4 vessels, 21,527 tons).
Dobson, W. and Co., Newcastle-on-Tyne (3 vessels, 15,828 tons).
Doxford, W. and Sons, Ltd., Sunderland (2 vessels, 12,816 tons, 6000 I.H.P.).
Dublin Dockyard Co., Ltd., Dublin (4 vessels, 9539 tons).
Dublin Shipbuilders. Ltd., Dublin (4 vessels, 2371 tons).
Duncan, Robt. and Co., Ltd., Port Glasgow (2 vessels, 11,330 tons).
Dunlop, Bremner and Co., Ltd., Port Glasgow (3 vessels, 6384 tons, 4500 I.H.P.).
Dunsmuir and Jackson, Glasgow (29,500 I.H.P.).
Dunstan, Richard, Thorne, Doncaster (6 vessels, 760 tons).
Duthie Torry Shipbuilding Co., John, Aberdeen (1 vessel, 1100 tons).
Earle's Shipbuilding and Engineering Co., Ltd., Hull (5 vessels, 19,702 tons, 26,000 I.H.P.).
Edwards and Co., Ltd., Millwall, London (17 vessels, 1409 tons).
Eltringhams, Ltd., Willing Quay-on-Tyne (2 vessels, 5244 tons, 2375 I.H.P.).
Fairfield Shipbuilding and Engineering Co., Ltd., Glasgow (3 vessels, 24,860 tons, 25,750 I.H.P.).
Ferguson Bros. (Port Glasgow), Ltd., Port Glasgow (4 vessels, 5200 tons, 4250 I.H.P.).
Fleming and Ferguson, Ltd., Paisley (4 vessels, 3047 tons, 8600 I.H.P.).
Forth Shipbuilding and Engineering Co., Ltd., Alloa (4 vessels, 16,853 tons, 2400 I.H.P.); Newcastle-on-Tyne (1 vessel, 2360 tons); total for two yards (5 vessels, 19,213 tons, 2400 I.H.P.).
Fullerton, John and Co., Paisley (2 vessels, 1535 tons).
Furness Shipbuilding Co., Ltd., Haverton-on-Tees (9 vessels, 46,613 tons).
Gauldie, Gillespie and Co., Ltd., Glasgow (1340 I.H.P.).
Goole Shipbuilding and Repairing Co., Ltd., Goole (2 vessels, 3341 tons).
Grangemouth Dockyard Co., Ltd., Grangemouth (1 vessel, 1935 tons).
Gray, Wm. and Co. (1918), Ltd., West Hartlepool (3 vessels, 20,305 tons, 30,570 I.H.P.).; Sunderland (2 vessels, 15,172 tons); total for two yards (5 vessels, 35,477 tons).
Grayson, H. and Co., Ltd., Garston (6 vessels, 8808 tons).
Greenock Dockyard Co., Ltd., Greenock (2 vessels, 11,600 tons).
Grey and Co., Ltd., Geo. T., South Shields (2600 I.H.P.).
Hall, Alexander and Co., Ltd., Aberdeen (4 vessels, 1694 tons, 2420 I.H.P.).
Hall, Russell and Co., Ltd., Aberdeen (2 vessels, 6900 tons, 4050 I.H.P.).
Hamilton, Wm. and Co., Ltd., Port Glasgow (4 vessels, 23,175 tons).
Hansen Shipbuilding Co., Bideford (2 vessels, 1746 tons).
Harkness, W. and Son, Ltd., Middlesbrough-on-Tees (1 vessel, 2662 tons).
Harland and Wolff, Ltd., Belfast (4 vessels, 39,856 tons, 37,200 I.H.P.).; Glasgow (3 vessels, 16,757 tons, 22,400 I.H.P.).; Greenock (1 vessel, 13,140 tons; total for all yards (8 vessels, 69,753 tons, 59,600 I.H.P.).
Hawthorne, Leslie, R. W., and Co., Ltd., Newcastle-on-Tyne (3 vessels, 27,573 tons, 25,150 I.H.P.).
Hawthorns and Co., Ltd., Leith (2 vessels, 2138 tons, 2400 I.H.P.).
Henderson, D. and W. and Co., Ltd., Glasgow (1 vessel, 6425 tons, 3500 I.H.P.).
Hepples, Ltd., South Shields (3 vessels, 1045 tons).
Hill, Charles and Sons, Ltd., Bristol (3 vessels, 8528 tons).
Holmes, Charles D. and Co., Ltd., Hull (6455 I.H.P.).
Hosking, T. and J., London (1610 I.H.P.).
Inglis, A. and J., Ltd., Glasgow (1050 I.H.P.).
Irvine's Shipbuilding and Dry Docks Co., Ltd., West Hartlepool (3 vessels, 14,084 tons).
Kincaid, J. G. and Co., Glasgow (46,600 I.H.P.).
Laing, Sir James and Co., Ltd., Sunderland (4 vessels, 30,524 tons).
Lea Shipbuilding Co., Ltd., Canning Town, London (6 vessels, 1000 tons).

Lewis, John, and Sons, Aberdeen (3 vessels, 2524 tons, 4050 I.H.P.).
Lilleshall Engineering Co., Oakengates, Salop (12,000 I.H.P.).
Lithgows, Ltd., Port Glasgow (6 vessels, 40,132 tons).
Livingstone and Cooper, Ltd., Hull (1 vessel, 2829 tons).
Lloyd Royal Belge (Gt. Britain), Ltd., Glasgow (7 vessels, 18,339 tons).
Lobnitz and Co., Ltd., Renfrew (8 vessels, 4180 tons, 5810 I.H.P.).
London and Glasgow Engineering and Iron Shipbuilding Co., Ltd., Glasgow. *See* Harland and Wolff, Ltd., Glasgow.
London and Montrose Shipbuilding and Repairing Co., Ltd., Montrose (1 vessel, 388 I.H.P.).
Lytham Shipbuilding and Engineering Co., Ltd., Lytham (8 vessels, 1963 tons, 3700 I.H.P.).
McColl and Pollock, Ltd., Sunderland (3575 I.H.P.).
McKie and Baxter, Govan, Glasgow (19,730 I.H.P.).
McMillan and Son, Ltd., Archibald, Dumbarton (1 vessel, 7424 tons).
Metropolitan-Vickers Electrical Co., Ltd., Manchester (9600 I.H.P.).
Monmouth Shipbuilding Co., Ltd., Chepstow, Mon. (2 vessels, 10,105 tons).
Mumford, A. G., Colchester (1280 I.H.P.).
Murdock and Murray, Ltd., Port Glasgow (2 vessels, 6139 tons).
Napier and Miller, Ltd., Old Kirkpatrick, nr. Glasgow (3 vessels, 14,731 tons).
North Eastern Marine Engineering Co., Ltd., Sunderland (13.210 I.H.P.). ; Wallsend-on-Tyne (31,010 I.H.P.) ; total for two yards (44,220 I.H.P.).
North of Ireland Shipbuilding Co., Ltd., Londonderry (2 vessels, 12,548 tons).
Osbourne, Graham and Co., Sunderland (2 vessels, 4538 tons).
Ouse Shipbuilding and Engineering Co., Ltd., Hook, near Goole (3 vessels, 5322 tons).
Palmers Shipbuilding and Iron Co., Ltd., Jarrow-on-Tyne and Hebburn-on-Tyne (12 vessels, 88,570 tons, 51,000 I.H.P.).
Parsons Marine Steam Turbine Co., Ltd., Wallsend-on-Tyne (57,505 I.H.P.).
Philip and Son, Ltd., Sandquay, Dartmouth (3 vessels, 814 tons, 1730 I.H.P.).
Pickersgill, W., and Sons, Ltd., Sunderland (3 vessels, 14,210 tons).
Plenty and Son, Ltd., Newbury (6870 I.H.P.).
Pollock, James, Sons and Co., Faversham (7 vessels, 666 tons).
Priestman, J. and Co., Sunderland (1 vessel, 4274 tons).
Ramage and Ferguson, Leith (2 vessels, 5811 tons, 1000 I.H.P.).
Rankin and Blackmore, Ltd., Greenock (12,000 I.H.P.).
Readhead, John and Sons, Ltd., South Shields (3 vessels, 10,888 tons, 6400 I.H.P.).
Rennie, Ritchie and Newport Shipbuilding Co., Ltd., Wyvenhoe (11 vessels, 1652 tons); Rutherglen (15 vessels, 1940 tons); Whiteinch (18 vessels, 1456 tons): total for all yards (44 vessels, 5048 tons).
Rennoldson, Charles and Co., Ltd., South Shields (2 vessels, 2558 tons).
Rennoldson, J. P., and Sons, Ltd., South Shields (1 vessel, 800 tons, 750 I.H.P.).
Richardson, Duck and Co., Ltd., Stockton-on-Tees (2 vessels, 10,571 tons).
Richardsons, Westgarth and Co., Ltd., Hartlepool (18,600 I.H.P.) ; Middlesbrough (42,850 I.H.P.); Sunderland (13,030 I.H.P.); total for all yards (74,480 I.H.P.).
Rollo, D., and Sons, Ltd., Liverpool (5700 I.H.P.).
Ropner Shipbuilding and Repairing Co. (Stockton) Ltd., Stockton-on-Tees (3 vessels, 12,866 tons).
Ross and Duncan, Govan, Glasgow (6,850 I.H.P.).
Rowan, D., and Co., Glasgow (37,200 I.H.P.).
Rowhedge Ironworks Company, Colchester (17 vessels, 1327 tons).
Scarr, Ltd., Henry, Hessle (11 vessels, 1544 tons).
Scotts' Shipbuilding and Engineering Co., Ltd., Greenock (4 vessels, 18,617 tons, 18,400 I.H.P.).
Shields Engineering and Dry Dock Co., Ltd., North Shields (1077 I.H.P.).
Short Bros., Ltd., Sunderland (2 vessels, 11,566 tons).
Simons, Wm., and Co., Ltd., Renfrew (4 vessels, 6840 tons, 15,100 I.H.P.).
Smith's Dock Co., Ltd., South Bank-on-Tees (6 vessels, 16,477 tons, 10,480 I.H.P.).
Stephen, Alex., and Son, Ltd., Glasgow (1 vessel, 5285 tons, 4500 I.H.P.).
Sunderland Shipbuilding Co., Ltd., Sunderland (2 vessels, 10,800 tons).
Swan, Hunter and Wigham Richardson, Newcastle-on-Tyne and Wallsend-on-Tyne (12 vessels, 76,035 tons, 31,475 I.H.P.); Southwick, Sunderland (2 vessels, 4366 tons); total for all yards (14 vessels, 80,401 tons, 31,475 I.H.P.).
Taw Shipyards, Barnstaple (5 vessels, 2430 tons).
Thompson and Sons, Ltd., Joseph L., Sunderland (3 vessels, 15,734 tons).
Thompson and Sons, Ltd., R., Sunderland (1 vessel, 3708 tons).
Thornycroft and Co., Ltd., Sir J. I., Southampton (12 vessels, 16,074 tons, 11,440 I.H.P.).
Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne (2 vessels, 9468 tons).
Vickers, Ltd., Barrow-in-Furness (9 vessels, 64,320 tons, 46,350 I.H.P.).

Vickers-Petters, Ltd., Ipswich (2477 I.H.P.).
Walker and Co., C. H., Sudbrook (7 vessels, 1369 tons).
Wallsend Slipway and Engineering Co., Ltd., Wallsend (50,310 I.H.P.).
Watson (Gainsborough), Ltd., J. S., Gainsborough (29 vessels, 3860 tons).
Weir, G. and J., Ltd., Cathcart, Glasgow.
White, J. Samuel and Co., Ltd., East Cowes (12 vessels, 5072 tons, 3280 I.H.P.).
Wood, Skinner and Co., Ltd., Newcastle-on-Tyne (3 vessels, 3706 tons).
Workman, Clark and Co., Ltd., Belfast (9 vessels, 53,638 tons, 32,900 I.H.P.).
Yarrow and Co., Scotstoun (12 vessels, 8349 tons, 12,300 I.H.P.).
Yeaman and Baggesen, Dundee (2178 I.H.P.).

LIST OF THE PRINCIPAL COLONIAL AND FOREIGN SHIPBUILDERS, MARINE ENGINEERS, AND REPAIRERS.

(*Showing in parentheses after their names the output of each for* 1921.)

A/S Akers Mek. Verksted, Christiania, Norway (5 vessels, 10,775 tons, 7150 I.H.P.).
Acciaiere di Venezia, Venice, Italy (1 vessel, 5784 tons).
Aktiengesellschaft Neptun, Rostock, Germany. *See* Neptun.
Alblasserdamsche Machinfabrick, Alblasserdam, Holland (2950 I.H.P.).
Alexander Brothers, Barcelona, Spain (1050 I.H.P.).
Allgemeine Electricitäts Gesellschaft, Berlin, Germany (11,550 I.H.P.).
Ansaldo, G. and Co., Sestri Ponente and Sampierdarena, Italy (3 vessels, 14,477 tons, 25,300 I.H.P.).
Ansaldo, San Giorgio, Spezia, Italy (8 vessels, 23,214 tons, 4870 I.H.P.).
Ansano Shipyard, Tsurumi, Japan (4 vessels, 28,095 tons, 17,800 I.H.P.).
Antwerp Engineering Co., Ltd. (Société Anon.), Hoboken, Belgium (1 vessel, 1831 tons).
Arsenale di Taranto, Taranto, Italy (1 vessel, 2500 tons, 1400 I.H.P.).
Atlantic Coast Co., Thomaston, Me., U.S.A. (5 vessels, 8325 tons).
Atlas-Densil Company, Stockholm, Sweden (1200 I.H.P.).
Atlas Engineering Co., Ltd., Copenhagen, Denmark (2750 I.H.P.).
Atlas Werke, Bremen, Germany (3 vessels, 3374 tons, 3300 I.H.P.).
Augsburg-Nürnberg Motorfabrik, Germany (15,800 I.H.P.).
Augustin-Normand, Chantiers et Ateliers, Le Havre, France (4 vessels, 1880 tons, 2000 I.H.P.).
Bacini and Scali Napoletani, Naples, Italy (3 vessels, 10,985 tons, 2500 I.H.P.).
Bailey and Co., W. S., Hong Kong (2 vessels, 382 tons, 250 I.H.P.).
Baltimore Dry Docks and Shipbuilding Co., Baltimore, U.S.A. (4 vessels, 27,645 tons).
Bath Ironworks, Bath, Me., U.S.A. (1 vessel, 6250 tons, 2200 I.H.P.).
Bergens Mekaniske Verksted, A/S, Bergen, Norway (1 vessel, 2850 tons, 2360 I.H.P.).
Bergsunde Mek. Verk., Stockholm, Sweden (2 vessels, 1536 tons, 1450 I.H.P.).
Bethlehem Shipbuilding Corporation, Ltd. (5 yards), Bethlehem, Penn., Pa., U.S.A. (52 vessels, 247,092 tons, 117,300 I.H.P.).
Blériot, M., Suresnes, France (13 vessels, 896 tons).
Blohm and Voss, Hamburg, Germany (10 vessels, 53,035 tons, 38,000 I.H.P.).
Boele's Shipbuilding Co., Bolnes and Slikkerveer, Holland (5 vessels, 7150 tons, 600 I.H.P.).
Bohn and Mees, Rotterdam, Holland (1 vessel, 7000 tons).
Bolnes Machinefabriek, Bolnes, Holland (1650 I.H.P.).
Borsig, A., Berlin-Tegel, Germany (3850 I.H.P).
Bretagne, Chantiers de, Nantes, France (5 vessels, 5617 tons, 12,700 I.H P.).
Brokeroens Skibsbyggeri, Svelvik, Norway (3 vessels, 1102 tons).
Brossard, Mopin and Co., Hsin Ho, China (3 vessels, 4323 tons).
Burgerhout Shipbuilding and Engineering Co., Ltd., Rotterdam, Holland (3 vessels, 8906 tons, 6665 I.H.P.).
Burn and Co., Ltd., Howrah, Bengal, India (24 vessels, 5573 tons, 1109 I.H.P.).
Burmeister and Wain, Ltd., Copenhagen, Denmark (4 vessels, 23,338 tons, 29,100 I.H.P.).
Caillard et Cie, Le Havre, France (2320 I.H.P.).
Canadian Allis-Chalmers, Bridgeburg, Ont., Canada (3800 I.H.P.).
Canadian Ingersoll-Rand Co., Sherbrooke, Quebec, Canada (850 I.H.P.).
Canadian-Vickers, Ltd., Montreal, Canada (2 vessels, 8864 tons, 5000 I.H.P.).
Cantiere Navali, Trieste, Italy (3 vessels, 16,363 tons).
Cantiere Navali Monfalcone, Monfalcone, Italy (4 vessels, 12,448 tons).
Castellamare Royal Dockyard, Castellamare, Italy (3 vessels, 3416 tons).

Cersusa, Cantieri, Voltri, Italy (1 vessel, 5404 tons, 2500 I.H.P.).
Chal'eassière, La, St. Etienne, France (1450 I.H.P.).
Chantiers de France, Dunkirk, France (3 vessels, 21,502 tons, 7900 I.H.P.).
Chantiers de la Loire, Nantes; St. Nazaire and St. Denis, France (5 vessels, 44,654 tons, 28,050 I.H.P.).
Chantiers de St. Nazaire, St Nazaire and Rouen, France (4 vessels, 28,720 tons, 13,200 I.H.P.).
Chantiers Maritimes du Sud-Ouest, Paris, France (5 vessels, 7790 tons).
Chantiers Navals Belge, Cruybeke, Belgium (8 vessels, 1840 tons).
Chickasaw Shipbuilding Co., Mobile, Ala., U.S.A. (10 vessels, 47,940 tons).
Choisy-le-Roi, Chantiers de, Choisy-le-roi, France (17 vessels, 4000 tons).
Christensen, H. C., Marstal, Denmark (1 vessel, 747 tons, 600 I.H.P.).
Christiansands Mekaniske Voerksted, Norway (1 vessel, 1200 tons, 900 I.H.P.).
Cockerill, John, and Co., Hoboken, Belgium (20 vessels, 9503 tons, 8230 I.H.P.).
Collingwood Shipbuilding Co., Ltd., Collingwood, Ont., Canada (3 vessels, 7077 tons, 1000 I.H.P.).
Copenhagen Floating Dock and Shipbuilding Co. (Kjöbenhavns Flydedokog Skibs A/S), Copenhagen, Denmark (8 vessels, 19,889 tons, 4250 I.H.P.).
Coughlan, J., and Sons, Vancouver, B.C., Canada (2 vessels, 10,924 tons).
Cramp, W., and Sons, Ship and Engine Building Co., Philadelphia, Pa., U.S.A. (2 vessels, 14,200 tons, 189,000 I.H.P.).
D'Antibes, Chantiers, Antibes, France (4 vessels, 159 tons, 200 I.H.P.).
Danziger Schichauwerft, Danzig (9 vessels, 24,334 tons, 14,900 I.H.P.).
Davie Shipbuilding and Repairing Co., Lauzon, Levis, Quebec, Canada (1 vessel, 5439 tons, 3000 I.H.P.).
De Laval Angturbin, Aktiebolag, Stockholm, Sweden (5100 I.H.P.).
"De Schelde," Koninklijke, Maats., Flushing, Holland (2 vessels, 15,971 tons, 66,600 I.H.P.).
Deutsch-Luxemburgische Werft, Emden, Germany (5 vessels, 13,852 tons).
Deutsche Werft, Aktien-Gesellschaft, Hamburg, Germany (21 vessels, 54,530 tons).
Deutsche Werft, Aktien-Gesellschaft, Kiel, Germany (12 vessels, 17,205 tons, 8700 I.H.P.).
Deutsche Werke Akt., Werk Rustringen, Wilhelmshaven, Germany (8 vessels, 1720 tons, 3200 I.H.P.).
Dominion Shipbuilding Co., Toronto, Ont., Canada (2 vessels, 3324 tons, 5000 I.H.P.).
"Dordrecht" Shipbuilding Co., Ltd., Dordrecht, Holland (1 vessel, 930 tons).
Doullut and Williams Shipbuilding Co., Inc., New Orleans, La., U.S.A. (2 vessels, 12,342 tons).
Downey Shipbuilding Corporation, Long Island, N.Y., U.S.A. (2 vessels, 4848 tons, 2900 I.H.P.).
Dubigeon, Chantiers, Nantes, France (7 vessels, 6758 tons).
Dyle et Bacalan, Bordeaux, France (2 vessels, 2449 tons).
Echevarrieta y Larrinaga, Cadiz, Spain (2 vessels, 6473 tons).
Eisenbeton Schiffbau, Bremen, Germany (1 vessel, 8000 tons).
Elbeschiffswerft, Wilhelmsburg, Germany (2 vessels, 2750 tons).
Elbe Nordseewerke, Hamburg, Germany (4 vessels, 2692 tons).
Elsinore Shipbuilding and Engineering Co. (Aktieselskabet Helsingors Jernskibs-og-Maskinbyggeri), Elsinore, Denmark (2 vessels, 4226 tons, 4200 I.H.P.).
Eriksbergs Works, Gothenburg, Sweden (1 vessel, 2500 tons, 1250 I.H.P.).
Esercizio Bacini, Societa, Riva Trigoso, Italy (3 vessels, 18,481 tons, 7500 I.H.P.).
Espanola de Construccion Naval, Sociedad, Ferrol, Bilbao, Cartagena, and Cadiz, Spain (6 vessels, 29,693 tons, 10,300 I.H.P.)
Euskalduna, Cia. de Construccion, Bilbao, Spain (8 vessels, 16,877 tons, 2200 I.H.P.).
Federal Shipbuilding Co., Kearney, N.J., U.S.A. (17 vessels. 74,214 tons, 26,800 I.H.P.).
Federale Cantiere, Pietra Ligure, Italy (1 vessel, 5100 tons, 3100 I.H.P.).
Fijenoord Maatschappij, Rotterdam, Holland (3 vessels, 18,012 tons, 6500 I.H.P.).
Flender Shipyard, Siems, Lubeck, Germany (8 vessels, 18,214 tons, 8000 I.H.P.).
Flensburger Schiffsbau-Gesellschaft, Germany (6 vessels, 38,199 tons, 22,215 I.H.P.).
Fossate and Co., Sestri Ponente, Italy (2500 I.H.P.).
Franco Tosi, Cantieri Navali, Taranto, Italy (1 vessel, 5100 tons, 2400 I.H.P.).
Franco Tosi, Legnano, Italy (21,100 I.H.P.).
Fratelli Migliardi, G. and A., Savona, Italy (1 vessel, 2311 tons, 1400 I.H.P.).
Fredriksstad Mek. Verksted, Fredriksstad, Norway (4 vessels, 10,044 tons, 2650 I.H.P.).
Frerischswerft, Einswarden, Germany (5 vessels, 13,439 tons).
Frichs, A/S., Aarhus, Denmark (1800 I.H.P.).
Fried Krupp, Germania Werft, Germany. *See* Krupp, Fried.
Fuginagata Shipyard, Osaka, Japan (1 vessel, 3794 tons, 2973 I.H.P.).
Fuller and Co., George A., Wilmington, N.C., U.S.A. (2 vessels, 12,700 I.H.P.).

Gall und Seitz, Hamburg, Germany (2000 I.H.P.).
Ganz and Co., Danubius, Budapest, Hungary (15 vessels, 5605 tons, 3470 I.H.P.).
Ganz and Co., Porto Re, Jugo-Slavia (4 vessels, 1800 tons, 1260 I.H.P.).
Garden Reach Workshops, Calcutta, India (2 vessels, 1056 tons).
Gebrüder Sachsenberg, Rosslau, Germany (3100 I.H.P.).
General Electric Co., Schenectady, N.Y., U.S.A. (598,200 I.H.P.).
Giessen and Zonen, G. Van Der, Krimpen, Holland (2 vessels, 13,700 tons).
Gironde, Chantiers de la, Bordeaux and Harfleur, France (10 vessels, 23,932 tons).
Görlitzer Maschinefabrik, Germany (4750 I.H.P.).
Götaverken, Gothenburg, Sweden (4 vessels, 22,480 tons, 16,800 I.H.P.).
Great Lakes Engineering Works (2 yards), Detroit, Mich., U.S.A. (1 vessel, 1255 tons, 3000 I.H.P.).
Groningen Scheepsverft and Machinefabriek, Groningen, Holland (3 vessels, 4500 tons).
Gutthoffnungshütte, Oberhausen, Germany (10,850 I.H.P.).
Halifax Shipyards, Ltd., Halifax, Canada (2 vessels, 14,356 tons).
Harma Jernstoperi and Mek. Verkstad, Harma, Norway (3800 I.H.P.).
Holeby Diesel Engine Works, Ltd., Holeby, Denmark (1030 I.H.P.).
Holens Værksted Larvik, Norway (2 vessels, 1980 tons).
Hong Kong and Whampoa Dock Co., Hong Kong (11 vessels, 27,267 tons, 17,957 I.H.P.).
Hoover, Owens, and Reutschler Co., Hamilton, Ohio, U.S.A. (59,200 I.H.P.).
Howaldtswerke, Kiel, Germany (2 vessels, 3500 tons, 1800 I.H.P.).
Ilva Cantiere Navali, Piombino, Italy (1 vessel, 6229 tons).
Ilva (Stab. Bagnoli) Societa, Naples, Italy (1 vessel, 6220 tons).
Inglis, J., and Co., Toronto, Ont., Canada (11,200 I.H.P.).
Ishikawajima Shipbuilding and Engineering Co., Tokyo, Japan (3 vessels, 6159 tons 4813 I.H.P.).
Janssen and Schmilinsky, Hamburg, Germany (10 vessels, 6906 tons, 1000 I.H.P.).
Jarlso Værft, Tonsberg, Norway (1 vessel, 928 tons, 600 I.H.P.).
Jonkopings Mekaniske Verksted, Jonkopings, Sweden (2200 I.H.P.).
Kawasaki Dockyard Co., Ltd., Kobe, Japan (8 vessels, 51,870 tons, 39,790 I.H.P.).
Kianguan Dock Co., Shanghai, China (3 vessels, 3614 tons, 5000 I.H.P.).
King and Co., Ltd., John, Hourah, India (29 vessels, 2740 tons, 450 I.H.P.).
Kjoge Værft, Kjoge, Denmark (2 vessels, 2428 tons).
Klawitter, J. W., Danzig (1 vessel, 1500 tons, 1200 I.H.P.).
Kobe Steel Works, Harima and Toba, Japan (12 vessels, 24,835 tons, 18,610 I.H.P.).
Kockums Mek. Verks, Malmö, Sweden (1 vessel, 3760 tons, 3350 I.H.P.).
Koninklijke Maatschappij de Schelde. *See* De Schelde.
Kremer, John D. W., Elmshorn, Germany (5 vessels, 2496 tons).
Krupp, Fried. A/G., Germaniawerft, Kiel-Gaarden, Germany (4 vessels, 9735 tons, 10,000 I.H.P.).
Larvik Slip and Verksted, Norway (2 vessels, 2461 tons, 1200 I.H.P.).
Langesunds Mekaniske Verksted, Langesunds, Norway (1 vessel, 782 tons, 500 I.H.P.).
Laxevaags Mack and Jernst, Bergen, Norway (1 vessel, 1670 tons, 850 I.H.P.).
Limhamns Sheppsvarv Aktiebolag, Limhamn, Sweden (2 vessels, 1521 tons).
Lindholmen Co., Gothenburg, Sweden (3 vessels, 13,584 tons, 6450 I.H.P.).
Llewellyn Iron Works, Los Angeles, Cal., U.S.A. (49,600 I.H.P.).
Lobithsche Scheepsbouw Maatschappij, N.V., Voor Geboreders Bodewes, Lobith, Holland (6 vessels. 10,275 tons).
Los Angeles Shipbuilding and Dry Dock Co., San Pedro, Cal., U.S.A. (5 vessels, 38,000 tons, 17,500 I.H.P.).
Lübecker Machinenbau Gesellschaft, Germany (6 vessels, 18,447 tons, 13,500 I.H.P.).
Marinens Hovedverft, Hortens, Norway (1 vessel, 192 tons, 3800 I.H.P.).
Maritimes du Sud-Ouest, Chantiers, Bordeaux, France (2 vessels, 10,424 tons).
Maskin-och Brobyggnads, Helsingfors, Finland (2 vessels, 2226 tons, 1600 I.H.P.).
Méditerranée, Chantiers de la, Havre and La Seyne, France (15 vessels, 29,048 tons, 27,465 I.H.P.).
Merchant Shipbuilding Corp., Bristol, Pa., U.S.A. (2 yards) (11 vessels, 69,775 tons).
Meyer's Shipbuilding Co., J., Zalt Bommel, Holland (6 vessels, 5398 tons).
Midland Shipbuilding Co., Ontario (1 vessel, 2421 tons, 1300 I.H.P.).
Mitsubishi Zosen Kaisha, Ltd., Nagasaki and Kobe, Japan (10 vessels, 44,630 tons, 45,200 I.H.P.).
Mitsui and Co., Tama, Inland Sea, Japan (3 vessels, 12,212 tons, 7016 I.H.P.).
Moller, A. P., Odense Shipyard, Denmark (4 vessels, 9795 tons).
Monfalcone, Cantiere Navali, Monfalcone, Italy. *See* Cantiere Navali Monfalcone.
Monica, A., Figueira da Foz, Portugal (2 vessels, 870 tons).
Moore Shipbuilding Co., San Francisco, U.S.A. (9 vessels, 71,534 tons).

Moss Vœrft, Aktieselsk, Norway (3 vessels, 3760 tons, 4100 I.H.P.).
Nakskov Skibsvœrft, Copenhagen, Denmark (3 vessels, 11,740 tons).
Navale Riuniti, Cantieri, Palermo and Ancona (4 vessels, 11,514 tons, 5200 I.H.P.).
Navale Finalpia, Cantiere, Finalpia, Italy (1 vessel, 1102 tons, 380 I.H.P.).
Navals Français, Chantiers, Caen, France (4 vessels, 10,302 tons).
Navegaçao, Soc. Const. de, S. Martinho, Portugal (2 vessels, 1343 tons).
Neptun, Actien-Gesellschaft, Rostock, Germany (4 vessels, 12,319 tons, 12,000 I.H.P.).
Netherlands Shipbuilding Co., Amsterdam, Holland (3 vessels, 21,688 tons).
New Burrell-Johnson Works, Yarmouth, N.S., Canada (1150 I.H.P.).
New Engineering and Shipbuilding Works, Shanghai, China (17 vessels, 9328 tons, 10,264 I.H.P.).
Newport News Shipbuilding Co., New York, U.S.A. (6 vessels, 94,302 tons, 55,600 I.H.P.).
New York Shipbuilding Corporation, Camden, New Jersey, U.S.A. (11 vessels, 141,531 tons, 48,200 I.H.P.).
New Waterway Shipbuilding Co., Schiedam, Holland (4 vessels, 32,609 tons, 4000 I.H.P.).
Nicolo Odero and Co., Foce, Genoa, Italy (3 vessels, 9423 tons, 3680 I.H.P.).
Nitta Shipyard, Osaka, Japan (1 vessel, 4147 tons, 1142 I.H.P.).
Nobellessner Co., Reval, Esthonia (1 vessel, 1100 tons, 225 I.H.P.).
Nobiskong Werft, Rendsberg, Germany (6 vessels, 3383 tons).
Norddeutsche Union Werke, Tonning, Germany (3 vessels, 5900 tons, 4500 I.H.P.).
Norddeutsche Werft, Bremerhaven, Germany (2 vessels, 8742 tons).
North-West Bridge and Iron Co., Portland, Or., U.S.A. (7 vessels, 57,449 tons).
Nusche Werke, Stettin, Germany (6 vessels, 12,311 tons).
Nylands Verksted, Christiania, Norway (2 vessels, 3733 tons, 2500 I.H.P.).
Odero, Fu Aless and Co , N., Sestri Ponente, Italy (1 vessel, 5544 tons, 3340 I.H.P.) .
Oderwerke, Stettin, Germany (7 vessels, 8380 tons, 11,900 I.H.P.).
Ono Shipyard, Osaka, Japan (2 vessels, 2200 tons, 1780 I.H.P.).
Oresunds Works, Landskrona, Sweden (3 vessels, 11,991 tons).
Orlando, Fratelli, Leghorn, Italy (4500 I.H.P.).
Orlogsvarftet, Copenhagen, Denmark (2 vessels, 2795 tons, 1700 I.H.P.).
Osaka Ironworks, Sakurajima, Osaka; Innoshima and Bingo Works, Japan (16 vessels, 39,802 tons, 30,225 I.H.P.).
Oskarshamns Mekaniska Verkstads Och Skeppsdockas, Aktiebolag, Oskarshamn, Sweden (2 vessels, 3617 tons, 2050 I.H.P.).
Ostseewerft, Stettin, Germany (2 vessels, 2950 tons).
Ottensener Werke, Altona, Germany (8900 I.H.P.).
Pacific Coast Shipbuilding Co., Bay Point, Cal., U.S.A. (2 vessels, 12,101 tons).
Pattison, C. and T. T., Naples, Italy (1800 I.H.P.).
Poole and Steel, Port Adelaide, Australia (2 vessels, 6702 tons, 4600 I.H.P.).
Port Union Shipbuilding Co., N.F.L., Newfoundland (2 vessels, 1100 tons).
Provençale de Const. Navales, La Ciotat, France (3900 I.H.P.).
Provence, Chantiers de, Port de Bouc, France (1 vessel, 4450 tons, 6000 I.H.P.).
Pusnœs Stoberi and Mek. Verksted, Arendal, Norway (2 vessels, 1928 tons).
Randolph Skibsbijggeri Fevig, Norway (2 vessels, 2800 tons).
Reiherstieg Werft, Hamburg, Germany (11 vessels, 10,891 tons, 11,550 I.H.P.).
Rosenbergs Mek. Versted, Stavanger, Norway (1 vessel, 6800 tons).
Rotterdam Dry Dock and Shipbuilding Co., Rotterdam, Holland (2 vessels, 10,627 tons, 5200 I.H.P.).
Sandvikens Skeppsdocka, Helsingfors, Finland (2 vessels, 2296 tons, 1500 I.H.P.).
San Rocco, Cantiere, Trieste, Italy (2 vessels, 13,490 tons).
Savoia, Cantiere Officine, Cornigliano, Italy (6 vessels, 26,772 tons).
Schichau, F., Elbing, Danzig (4 vessels, 4538 tons, 3550 I.H.P.).
Schneider et Cie., Le Creusot, France (5250 I.H.P.).
Seebeck and Co., Georg, Geestemunde, Germany (4 vessels, 9148 tons, 7700 I.H.P.).
Seine Maritime, Chantiers de la, Le Trait, France (1 vessel, 6800 tons, 1300 I.H.P.).
Selvik Skibsvœrft, Selvik, Norway (2 vessels, 1178 tons).
Shalimar Works, Ltd., Hourah, India (23 vessels, 1822 tons).
Shanghai Dock and Engineering Co., Shanghai, China (6 vessels, 11,293 tons, 6335 I.H.P.).
Skiens Verkstedr., Skiens, Norway (1 vessel, 1162 tons, 800 I.H.P.).
Solvesborgs Skeppevarv. and Rederiakt, Solvesborgs, Sweden (2 vessels, 1600 tons, 700 I.H.P.).
Smulders, A. F. *See* Werf Gusto.
South-Western Shipbuilding Co., San Pedro, Cal., U.S.A. (4 vessels, 25,754 tons).
Stabilimento Tecnico Triestino, Trieste, Italy (1 vessel, 5440 tons, 7800 I.H.P.).
Standard Shipbuilding Corporation, New York, U.S.A. (5 vessels, 22,735 tons, 750 I.H.P.).

Standifer Corporation, G. M., Vancouver, Wash., U.S.A. (3 vessels, 24,626 tons).
Stavanger Stoberi and Dok, Norway (2 vessels, 5497 tons).
Straten Island Shipbuilding Co., Straten Island, N.Y., U.S.A. (10 vessels, 11,254 tons, 8100 I.H.P.).
Stuhr's Works, P. Ph., Aalborg, Denmark (2 vessels, 2295 tons).
Stulcken Sohn, H. C., Hamburg, Germany (5 vessels, 9610 tons, 2400 I.H.P.).
Submarine Boat Corporation, Newark, New Jersey, U.S.A. (4 vessels, 14,180 tons).
Sulzer Frères, Winterthur, Switzerland (8500 I.H.P.).
Sun Shipbuilding Co., Chester, Pa., U.S.A., (10 vessels, 75,658 tons, 49,500 I.H.P.).
Svendborg Skibsværft, Copenhagen, Denmark (2 vessels, 3294 tons, 700 I.H.P.).
Taikoo Dockyard Co., Hong Kong (7 vessels, 10,926 tons, 5250 I.H.P.).
Tampa Shipbuilding Co., Tampa, Fla., U.S.A. (4 vessels, 29,451 tons).
Tecklenborg, Joh. C., Geestemunde, Germany (9 vessels, 48,070 tons, 21,800 I.H.P.).
Texas Steamship Co., Bath, Maine, U.S.A. (3 vessels, 14,062 tons).
Thompson and Co., Castlemaine, Victoria, Australia (2300 I.H.P.).
Tidewater Shipbuilding Co., Three Rivers, Quebec, Canada (1 vessel, 4800 tons, 6550 I.H.P.).
Todd Shipyards Corporation, Brooklyn and Tacoma, U.S.A. (4 vessels, 11,180 tons).
Trondhjems Mekaniske Værksted, Norway (1 vessel, 1880 tons, 1600 I.H.P.).
Uchida Shipbuilding Co., Yokohama, Japan (1 vessel, 5266 tons, 3563 I.H.P.).
Union Construction Co., Oakland, Cal., U.S.A. (9 vessels, 35,661 tons).
Union Shipbuilding Co., Baltimore, U.S.A. (2 vessels, 13,261 tons).
United Engineers, Ltd., Singapore, Straits Settlements (28 vessels, 998 tons).
United Machine Factories, Prague, Bohemia (9300 I.H.P.).
Unterweser Schiffbau, Lebe, Germany (12 vessels, 10,529 tons).
Uraga Dock Co., Kobe, Japan (3 vessels, 5300 tons, 4610 I.H.P.).
Vaxholmsvarvet, Ramso, Norway (1 vessel, 2300 tons).
Vuijk and Sons, Capelle, A. D. Ysel, Holland (2 vessels, 5174 tons).
Vulcan Ironworks Co., Jersey City, N.J., U.S.A. (9850 I.H.P.).
Vulcan Werft, Hamburg, Germany (2 vessels, 11,884 tons, 6500 I.H.P.).
Vulcan Werft, Vegesack, Germany (10 vessels, 79,850 tons, 47,700 I.H.P.).
Vulcan Yard, Stettin-Bredow, Germany (7 vessels, 46,290 tons, 18,000 I.H.P.).
Walkers, Ltd., Maryborough, Queensland, Australia (2 vessels, 8500 tons, 3200 I.H.P.).
Wallace Shipyards, North Vancouver, B.C., Canada (2 vessels, 9573 tons, 7500 I.H.P.).
Werf Conrad, Haarlem, Holland (2 vessels, 5159 tons).
Werf de Noord, Alblasserdam, Holland (1 vessel, 6750 tons, 3000 I.H.P.).
Werf Gusto (A. F. Smulders), Schiedam, Holland (6 vessels, 9001 tons, 5300 I.H.P).
Werf Zeeland, Hausweert, Holland (5 vessels, 6750 tons).
Werkspoor Engine Works, Amsterdam, Holland (18,484 I.H.P.).
"Weser" Aktien-Gesellschaft, Bremen, Germany (6 vessels, 38,199 tons, 22,000 I.H.P.).
Westinghouse Co. (2 shops), Essington and Pittsburgh, U.S.A. (43,700 I.H.P.).
Winton Engine Works, Cleveland, Ohio, U.S.A. (13,565 I.H.P.).
Yokohama Dock Co., Yokohama, Japan (6 vessels, 31,270 tons, 27,552 I.H.P.).
Zeeland, Werf, Holland. *See* Werf Zeeland.

THE PRINCIPAL STEAMSHIP SERVICES OF THE WORLD.

All lines run return journeys in reverse order to services given, except where otherwise stated.

(Particulars of the Steamship Lines and Companies mentioned will be found in the "List of Principal British and Foreign Shipowners," p. 521.)

AFRICA, EAST.

British India Line; from London and Middlesbrough to Principal Ports of East Africa (*passengers and cargo*).

Clan Line; from Glasgow, Liverpool and Newport to Madagascar (*passengers and cargo*).

Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Havre and Marseilles to Madagascar (East Coast), Réunion and Maurice Isle (*passengers and cargo*); from Havre, Bordeaux, and Marseilles to Madagascar (West Coast) and Mozambique (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).
Hall Line; from Glasgow and Liverpool to all East African Ports (*passengers and cargo*).
Hamburg-Amerika Linie; from Hamburg to Madeira, Canary Islands, and Chief Ports of East Africa (*passengers and cargo*).
Hamburg-Bremen-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).
Harrison Line; from Birkenhead and Glasgow to Principal Ports of East Africa (*cargo*).
Houlder Bros. and Co., Ltd.
Houston Line.
Union-Castle Line; from London and Southampton to all East African Ports (*passengers, mail, and cargo*).
Woermann-Linie, Aktien-Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).

Africa, South.
Aberdeen Line; from London and Plymouth to Durban, Cape Town, and Port Elizabeth (*passengers and cargo*).
British Africa Shipping and Coaling Co., Ltd.; from London and Plymouth to Durban and Cape Town (*passengers and cargo*).
Clan Line; from Glasgow, Liverpool, and Newport to Cape Town, Port Elizabeth and Durban (*passengers and cargo*).
Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).
Ellerman and Bucknall Steamship Co., Ltd.; from United Kingdom (*weekly cargo services*); from Australia (*fortnightly cargo sailings*); from New York to Cape Town, Port Elizabeth, and Durban (*fortnightly cargo sailings*).
Furness, Withy and Co., Ltd. *See* Prince Line.
Hall Line; from Glasgow and Liverpool to Cape Town, Mossel Bay, Algoa Bay, East London, Natal, Delagoa Bay, and Mauritius (*cargo*).
Hamburg-Amerika Linie; from Hamburg to South Africa (*cargo and passengers*).
Hamburg-Bremen-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).
Harrison Line; from Birkenhead, Glasgow and Newport (*cargo*).
Houlder Bros. and Co., Ltd.; from London and Plymouth to Cape Town, Durban, and Port Elizabeth (*passengers and cargo*).
Houston Lines; from United Kingdom; from United States (*both cargo services, carrying a few passengers*).
Natal Line of Steamers, Ltd.; from London and Plymouth to chief South African Ports (*passengers and cargo*).
Peninsular and Oriental Branch Service; from London to Adelaide, Melbourne, and Sydney *viâ* Cape Town (*passengers, one class only, mails and cargo*).
Prince Line; from New York to South African Ports (*cargo*).
Shaw, Savill and Albion Co., Ltd.; from London to Australia, *viâ* the Cape of Good Hope (outwards, *general cargo;* homewards, *a large amount of meat and dairy produce in cold storage*).
Union-Castle Line; from London and Southampton to Beira, Chinde, Cape Town, Port Natal, and East London (*passengers, mails, and cargo*).
White Star Line; from Liverpool to Australia, calling at Cape Town (*passengers and cargo*).
Woermann-Linie, Aktien Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).

Africa, West.
African Steamship Co.; from Liverpool and London to principal West African Ports (*passengers and cargo*).
British and African Steam Navigation Co., Ltd.; from Liverpool and Rotterdam to principal West African Ports (*passengers and cargo*).
Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief West African Ports (*passengers and cargo*).
Elder, Dempster and Co. Ltd.; from Liverpool, London, and Rotterdam to principal West African Ports (*passengers and cargo*).
Hamburg-Amerika Linie; from Hamburg to West Africa (*passengers and cargo*); Hamburg to South West Africa (*passengers and cargo*).
Holt and Co. (Liverpool), Ltd.; from Liverpool to principal West African Ports (*passengers and cargo*).
Houston Lines.

Union-Castle Line; from London and Southampton to Port Amelia, Mozambique, Réunion, Mombassa, and Zanzibar (*passengers, mails, and freight*).
Woermann-Linie, Aktien-Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief West African Ports (*passengers and cargo*).

America, Central.
Blue Funnel Line. *See* Alfred Holt and Co.
Canadian Pacific Railway Co.; from Montreal and Quebec (summer), St. John (winter), to Havana, Cuba, *viâ* Boston (*passengers and cargo*).
Canadian Government Merchant Marine, Ltd.; Montreal to Havana, Cuba (*cargo*); Montreal to Nassau, Kingston (Ja.), Jamaica and Belsize (B.H.) (*passengers and cargo*); Montreal to Barbados, Trinidad, and British Guiana (*cargo*). During the winter these services operate from Halifax, N.S.
Clyde Steamship Co.; from New York to Santo Domingo City and Azua, *viâ* Turks Island, calling at Monte Cristo, Puerto Plata, Samana, Sanchez, La Romana, and Macoris (*passengers and cargo*).
Cuban Line; from Antwerp and London to the Ports of Central America (*passengers and cargo*).
Davies Steamship Co., W. R.; from London to Panama (*passengers and cargo*).
Elders and Fyffes; from Avonmouth and Easton to Panama (*cargo*).
Furness Line; from New York to Bermuda (*passengers and cargo*); New York to West Indies (*passengers and cargo*); from New York to Trinidad (*passengers and cargo*).
Furness, Withy and Co., Ltd. *See* Furness Line.
Hamburg-Amerika Line; from Hamburg to Cuba and Mexico (*passengers and cargo*); from Hamburg to West Indies (*passengers and cargo*); from Hamburg to West Coast Ports, *viâ* Panama (*passengers and cargo*).
Harrison Line; from Glasgow to West Indies and Demerara (*cargo*); from London to West Indies and Demerara (*cargo*); from Swansea, Glasgow, and Liverpool to North Pacific Ports, *viâ* Panama Canal (*cargo*); from Liverpool to West Indies, Mexico, and Brazil (*cargo*).
Holt and Co., Alfred.
Houston Lines; from River Plate (*cargo service, carrying a few passengers*).
Hugo Stinnes Linien; from Hamburg to Cuba and Mexico (*passengers and cargo*).
Larrinaga Line; from Liverpool to Antilla, Cardenas, Cienfuegos, Cuba, Havana, Mantanzas, Sagua la Grande, and Santiago de Cuba (*passengers, freights, and mails*).
Leyland Line; from Liverpool, London, and Manchester to Panama (*passengers and cargo*).
New York and Porto Rico Steamship Co. *See* Porto Rico Line.
New Zealand Shipping Co., Ltd.; through the Panama Canal from London to New Zealand and Australia.
Panama Rail Road Steamship Co.; from New York, Port au Prince (Haiti), to Cristobal (Canal Zone, Panama) (*passengers and cargo*).
Porto Rico Line; from New York to San Juan, Ponce, and Mayaguez (*freight and passengers*); from New Orleans to San Juan, Ponce, and Mayaguez (*freight*).
Royal Mail Steam Packet Co.; from London and Hull to West Indies and British Guiana (*cargo only*); from Hull and London to Jamaica (*cargo only*); from Hull and London to Hayti and Domingo (*cargo only*); from Hull and London to Colon and Central American Pacific Ports (*cargo only*); from Hull, Bremen, and Rotterdam to Havana and Galveston (*passengers, mails, and cargo*); from St. John, N.B., and Halifax, N.S., Canada to Bermuda, West Indies, and Demerara (*passengers, mails and cargo*).
Shaw, Savill and Albion Co., Ltd.; through the Panama Canal from London to New Zealand; this service is run in conjunction with the White Star Line (*passengers and cargo*).
Stinnes Linien, Hugo. *See* Hugo Stinnes Linien.
White Star Line, jointly with Shaw, Savill and Albion Co., Ltd.; from London to New Zealand *viâ* Panama (*passengers and cargo*).

America, South.
"Artus" Line. *See* Hugo Stinnes Linien.
Booker Line; from Liverpool to principal South American Ports (*cargo*).
Booth Line; from Havre, Liverpool, Lisbon, London and Madeira, to principal South American Ports (*passengers and cargo*).
British and Argentine Steam Navigation Co., Ltd.; from Liverpool to River Plate Ports (*passengers and cargo*).
Canadian Government Merchant Marine, Ltd.; Montreal to Santos, Rio de Janeiro, Montevideo, and Buenos Aires (*cargo*). During the winter months this service operates from Halifax, N.S.

Compania Naviera Sota y Aznar (Spanish Line); from Hamburg to Rio de Janeiro, Santos, Monte Video and Buenos Aires.

Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Davies Steamship Co., W. R.; from Liverpool to principal South American Ports (*cargo*).

Donaldson South American Line; from Glasgow, Liverpool, and London to Monte Video and Buenos Aires—also by transhipment to other River Plate Ports (*refrigerated cargo*).

Grace Lines; from New Orleans to Ports of Equador, Peru, and Chile (*passengers, cargo, and mails*).

Furness-Houlder Argentine Lines, Ltd.; from London and Liverpool to chief Ports of Argentine and Uruguay (*refrigerated cargo and a few first-class passengers*).

Furness, Withy and Co., Ltd. *See* Prince Line and Furness-Houlder Argentine Lines.

Hall Line; from Calcutta to River Plate Ports (*cargo*).

Hamburg-Amerika Line; from Hamburg to Brazil and La Plata Ports (*passengers and cargo*).

Hamburg-Südamerikanische Dampfschiffahrts-Gesellschaft; from Hamburg to Brazil, Uruguay, and Argentina (*passengers*).

Henderson and Co., Ltd.; from Glasgow to principal South American Ports (*cargo*).

Holland and Co., Ltd., Arthur; from Newport to principal South American Ports (*cargo*).

Houlder Bros. and Co., Ltd.; from Antwerp, London, Liverpool, and Bristol to Monte Video, Buenos Aires, and Rosario, calling en route at Las Palmas or Teneriffe (Outwards, *general cargo and passengers;* Homewards, *frozen and chilled meat, dairy produce, general cargo, and passengers*).

Houston Lines; from Glasgow and Liverpool to River Plate; from United States to River Plate; from Canada to River Plate; from West Indies to River Plate (*all cargo services, carrying a few passengers*).

Hugo Stinnes Linien; from Hamburg to Portuguese Ports, Pernambuco, Monte Video, Buenos Aires, and Rosario (in association with the "Artus" Line, Danzig) (*passengers and cargo*).

Kaye, Son and Co., Ltd.; from Liverpool to principal South American Ports (*cargo*)

Koninklijke Hollandsche Lloyd; from Amsterdam to Buenos Aires, calling en route at Southampton, Cherbourg, La Corunna, Vigo, Leixoes, Lisbon, Las Palmas, Pernambuco, Bahia, Rio de Janeiro, Santos, and Monte Video (*passengers, mails, and freights*).

Lamport and Holt.

Leeds Shipping Co., Ltd.. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Maciver Line; from London to principal South American Ports (*cargo*).

Nelson, Ltd., H. and W.; from London to Buenos Aires, calling on the outward journey at Boulogne, Corunna, Vigo, Rio de Janeiro, and Monte Video, and on the homeward at Monte Video and Las Palmas; from Liverpool to Buenos Aires, calling at Monte Video, and at Las Palmas on the homeward voyage (*cargo, passengers, and mails*).

Oakwin Steam Ship Co., Ltd. *See* Smith and Sons, Ltd., Sir. Wm. Reardon.

Prince Line, Ltd.; from London, Middlesbrough, and Antwerp to River Plate Ports (*cargo*); from New York to River Plate Ports (*cargo*); from New York to Brazil (*cargo*).

Ritson, F. and W.; from Glasgow, Liverpool, and London to principal South American Ports (*cargo*).

Roland-Linie, Aktien Gesellschaft; from Bremen and Hamburg to Chile, Peru, and Ecuador (*passengers and cargo*).

Rotterdam-Zuid Amerika Lijn; from Hamburg, Rotterdam, and Antwerp to Buenos Aires, Monte Video, Santos, Rio de Janeiro, Bahia, and Pernambuco, calling at Bilbao, Santander, and Vigo (*cargo, carrying a few passengers*).

Royal Mail Steam Packet Co.; from Southampton to Buenos Aires, calling at French, Spanish, and Portuguese Ports, Madeira, Las Palmas, Teneriffe, St. Vincent (C.V.) and the Ports of Brazil, Uruguay, and Argentina (*mails, passengers, and cargo*), and similar service from Liverpool; from London to Rio de Janeiro, calling at Hamburg, Antwerp, Hull, and Swansea (*cargo only*), and similar service to Santos; from Hull and London to Buenos Aires (*cargo only*); from Hull and London to Demerara in British Guiana (*cargo only*); from Hull and London to Cristobal and Columbia (*cargo only*); from Barry and Swansea to Rio de Janeiro and Santos (*cargo only*); from St. John, N.B., and Halifax, N.S., to Bermuda, West Indies, and Demerara, British Guiana (*passengers, mails, and cargo*).

St. Just Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Shaw, Savill and Albion Co., Ltd.; from London to New Zealand, proceeding on the outward journey *viâ* the Panama Canal, and on the homeward journey *viâ* Cape Horn, calling at Monte Video and Teneriffe (*cargo, and meat and dairy produce in cold storage on homeward voyage*).

Smith and Sons, Ltd., Sir Wm. Reardon; from United Kingdom and Continent to River Plate Ports (*cargo*).

Sota y Aznar; from Hamburg, Rotterdam, Antwerp, and Bilbao to Pernambuco, Bahia, Rio de Janeiro, Santos, Monte Video, and Buenos Aires (*cargo*).

Stinnes Linien. *See* Hugo Stinnes Linien.

Toyo Kisen Kaisha; from Hong Kong, Moji, Kobe, Yokohama, Honolulu, and Hilo to San Francisco, Portland, Los Angeles, Salina Cruz, Balbao, Callao, Mollendo, Arica, Iquique, and Valparaiso (*passengers and mails*).

AUSTRALIA AND NEW ZEALAND.

Aberdeen Line; from London and Plymouth.

Anderson, Green and Co., Ltd. *See* Orient Line.

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from London to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane (*passengers and cargo*).

Canadian-Australian Line. *See* Canadian Pacific Railway Co.

Canadian Government Merchant Marine, Ltd.; from Vancouver (*cargo*); from Montreal (*cargo*). During the winter months the Service from Montreal operates from Halifax, N.S.

Canadian Pacific Railway Co., in conjunction with the Canadian-Australian Line; from Vancouver to Honolulu, Suva, Fiji, Auckland, N.Z., and Sydney, Australia (*passengers and cargo*).

Commonwealth and Dominion Line; from London, Middlesbrough, Hull, and Antwerp to Auckland, Wellington, Lyttleton, and Dunedin, N.Z., *viâ* the Panama Canal; from New York to Australia *viâ* the Cape; from New York to New Zealand and Australia *viâ* the Panama Canal; from Dunkirk, Antwerp, London, Hull, and Liverpool *viâ* the Suez Canal, to Australia; from Middlesbrough, Hull, Antwerp, and London to Adelaide, Melbourne, Sydney, Newcastle, N.S.W., and Hobart *viâ* the Cape (*cargo and passengers*).

Commonwealth Government Line of Steamers; from Antwerp, Bristol, Glasgow, Hull, Liverpool, London, Middlesbrough, and Newport to Fremantle, Perth, Adelaide, Hobart, Launceston, Melbourne, Sydney, Newcastle (N.S.W.), and Brisbane (*cargo*); from London to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, *viâ* Port Said and Colombo (*passengers and cargo*); from United Kingdom Ports to Brisbane, Sydney, and Melbourne *viâ* Panama (*cargo*).

Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Cunard Line; from Bristol, Liverpool, London, and Queenstown.

Eastern and Australian Steamship Co. Ltd. to Adelaide, Hobart, Melbourne, and Fremantle (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from London (*monthly cargo services*); from New York (*monthly cargo services*); from South Africa (*fortnightly cargo services*).

Federal Steam Navigation Co., Ltd.; from London and West Coast Ports of Great Britain to Principal Ports of Australia (*passengers and cargo*).

Hall Line; from Liverpool to principal Australian Ports (*passengers and cargo*).

Henderson and Co., Ltd.; from Glasgow and Liverpool to principal Australian Ports (*cargo*).

Holt and Co., Alfred.

Leeds Shipping Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Liverpool Line to Australia; from Liverpool and Manchester to principal Australian Ports (*passengers and cargo*).

London Line; from Bristol, Glasgow, Liverpool, and London to principal Australian Ports (*passengers and cargo*).

McIlwraith, McEacharn's Line; from Sydney to Melbourne, Adelaide, Albany, and Fremantle (*cargo*).

New Zealand Shipping Co., Ltd., from London, *viâ* the Panama Canal, to principal Australian and New Zealand Ports (*mails, passengers, and cargo*).

Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Orient Line to Australia; from Tilbury to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Toulon, Naples, Port Said, and Colombo, also on the return journey at Plymouth. At certain seasons of the year the vessels call at Hobart, Tasmania (*passengers, cargo, and mails for Commonwealth of Australia*).

Peninsular and Oriental Branch Service; from London to Adelaide, Melbourne, and Sydney, *viâ* Cape Town (*passengers—one class only—mails and cargo*).

Peninsular and Oriental Line; from London.
St. Just Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.
Shaw, Savill and Albion Co., jointly with White Star Line; from London to Port Chalmers *viâ* Panama Canal, calling at Auckland, Wellington, and Lyttleton (*passengers, mails, and cargo*); from London to New Zealand, proceeding on the outward journey *viâ* the Panama Canal, and on the return journey *viâ* Cape Horn, and calling at Monte Video and Teneriffe (*cargo*).
Shire Line; from Glasgow to principal Australian Ports (*cargo*).
Smith and Sons, Ltd., Sir Wm. Reardon; from United Kingdom and Continental Ports to New Zealand (*cargo*).
Trinder, Anderson and Co.; from London to principal Australian Ports (*cargo*).
Turnbull, Martin and Co.; from London to principal Australian Ports (*cargo*).
White Star Line; from Liverpool to Sydney, calling at Cape Town, Albany, Adelaide, and Melbourne (*passengers and cargo*); from Liverpool to Australia, direct (*cargo*); from Liverpool to New Zealand, direct (*cargo*), jointly with Shaw, Savill and Albion Co., Ltd.; from London to Port Chalmers *viâ* the Panama Canal, calling at Auckland, Wellington, and Lyttleton (*passengers, mails, and cargo*).
Workman, Arbuckle and Mackinson; from London to principal Australian Ports (*cargo*).

Baltic and North Sea.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Hamburg, calling at Glasgow, Havre, Liverpool, and London (*fortnightly cargo sailings*).
Bachke and Co.; from Hull, Liverpool, London, Manchester and Swansea.
Becker and Co., Ltd.; from East and West Coast Ports of the United Kingdom to principal Baltic Ports (*passengers and cargo*).
Ben Line Steamers, Ltd.; from Leith and other Scottish Ports to Petrograd and Reval (*cargo and a few passengers*).
Bergenske Dampskibsselskab, Det.; from Glasgow, Manchester, Middlesbrough and Newcastle to Principal Ports of Norway and Sweden (*passengers and cargo*).
Brodin, Erik; from London to Principal Ports of Norway and Sweden (*passengers and cargo*).
Bürton, Smart and Orford, Ltd. *See* Scandia Lines.
Cook and Son, John; from Aberdeen and Granton to principal Baltic Ports (*passengers and cargo*).
Cormack and Co., James; from Aberdeen, Dundee, Grangemouth, Leith, Montrose, and Methil to Principal Ports of Norway and Sweden (*passengers and cargo*).
Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm Reardon.
Currie Line. *See* Leith, Hull and Hamburg Steam Packet Co.
Ellerman's Wilson Line; from Grimsby, Hull, Liverpool, London, Newcastle and Swansea to Principal Ports of Baltic, Norway, and Sweden (*cargo*).
Finland Line; from Liverpool to Helsingfors (*cargo*).
Finland Steamship Co., Ltd. *See* Finska Ångfartygs Aktiebolaget.
Finska Ångfartygs Aktiebolaget; from Hull to Copenhagen, Helsingfors, Hangö, and Åbo (*passengers and cargo*); from Stettin and Lübeck to Helsingfors and Hangö (*passengers and cargo*); from Stockholm to Helsingfors and Åbo (*passengers and cargo*); from Reval to Helsingfors or Hangö (*passengers and cargo*). The foregoing lines carry mails for Germany, Sweden, and Esthonia. From Hull, London, Liverpool, and Manchester to Finnish Ports (*cargo*); from Rotterdam, Antwerp, and Copenhagen to Finnish Ports (*cargo*).
Forenede Dampskibsselskab., Det.; from Hull, London and Manchester to Ports of Scandinavia (*passengers and cargo*).
Glen and Co.; from Glasgow to Holland and Belgium (*cargo*).
Head Line and Lord Line; from Belfast, Dublin, and Pernau to Petrograd, Reval, and Riga (*chiefly cargo*); from Belfast, Dublin, Cork, and Londonderry to Hamburg, Amsterdam, Antwerp, and Rotterdam (*chiefly cargo*).
Leeds Shipping Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.
Leith, Hull and Hamburg Steam Packet Co., Ltd.; from Leith to Hamburg (*passengers and cargo*); from Grangemouth and Dundee to Hamburg (*cargo*); from Aberdeen and Middlesbro' to Hamburg (*cargo*); from Leith to Bremen (*cargo*); from Leith to Copenhagen (*cargo*).
Lord Line. *See* Head Line and Lord Line.
Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.
Preston Steam Navigation Co., Ltd.; from East and West Coast Ports of the United Kingdom to Principal Ports of Baltic and Norway (*passengers and cargo*).
Royal Mail Steam Packet Co.; from London, Hamburg, Antwerp, Hull, and Swansea to Brazil (*cargo only*); from Hull, Bremen, and Rotterdam to Havana

and Galveston (*passengers, mails, and cargo*); from Hamburg, Southampton, and Cherbourg to New York (*passengers, mails, and cargo*); from Hamburg, Rotterdam, Antwerp, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*).

St. Just Steam Ship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Salvesen and Co., Chr.; from Leith to Gothenburg (*cargo*); from Grangemouth to Drontheim, calling at Stavanger, Bergen, Aalesund, and Christiansund (*cargo*).

Salvesen and Co., J. T.; from Grangemouth to principal Baltic Ports (*cargo*).

Scandia Lines; from Hamburg to London (8-*day freight service*); from London to Gothenburg, Christiania, and Copenhagen (10-*day freight service*).

Smith and Sons, Ltd., Sir William Reardon; from New York, Philadelphia, and Baltimore to Bremen and Hamburg (*cargo*); from New York, Philadelphia, and Baltimore to Rotterdam and Hamburg (*cargo*).

Stott and Co., Ltd., W. H.; from London and Manchester to principal Scandinavian Ports (*cargo*).

West Hartlepool Steam Navigation Co., Ltd.; from West Hartlepool to Christiania and Stockholm (*passengers and cargo*).

CANADA.

Anchor-Donaldson Line; summer service from Glasgow to Quebec and Montreal (*passengers and cargo*); winter service, from Glasgow to St. John, N.B., Halifax, N.S., and Portland, Me. (*passenger and cargo*).

Becker and Co., Ltd. · from East and West Coast Ports of the United Kingdom to Quebec (summer), and St. John, N.B. (winter) (*cargo*).

Cairns, Noble and Co., Ltd.; from Calais, Hull, Middlesbro', Leith, and Dundee to Montreal and Portland, Maine (*cargo*); from Mediterranean Fruit Ports to St. John, N.B., and Montreal.

Canada Steamship Lines, Ltd.; from Montreal (summer), and St. John, N.B. (winter), to Newfoundland (*passengers and cargo*); from Port Arthur to Chicontimi, calling at Duluth, Fort William, Sault Ste. Marie, Sarnia, Port Colborne, Hamilton, Toronto, Kingston, Brockville, Prescott, Cornwall, Montreal, Quebec, Murray Bay, and Ladousac (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; Montreal to Glasgow, Scotland (*cargo*); Montreal to Liverpool, England (*cargo*): Montreal to London, England (*cargo*); Montreal to Swansea and Cardiff, Wales (*cargo*). (During the winter months all these services operate from St. John, N.B.)

Canadian Pacific Steamships, Ltd.; from Avonmouth (*cargo only*), Antwerp (*viâ* Southampton), Glasgow, Liverpool, London (*cargo only*), and Southampton (*viâ* Cherbourg) to Quebec and Montreal in the St. Lawrence season; and to St. John in the winter season (*passenger, freight, and mails*).

Canadian Pacific Railway Co.; from London, Liverpool, Glasgow, Bristol, Cardiff, Southampton, Havre, Antwerp, Hamburg, Naples, and Genoa to Montreal and Quebec (summer season), and St. John, N.B. (winter season) (*passengers and cargo*); from Havana and Cuba *viâ* Boston to Montreal and Quebec (summer), and St. John (winter) (*passengers and cargo*).

Cunard Line; from Bristol, Liverpool, London and Queenstown to Quebec, Montreal, and Halifax, N.S. (*passengers*).

Dominion Line; from Bristol and Liverpool to Quebec (summer), and St. John, N.B. (winter) (*passengers and cargo*).

Donaldson Brothers, Ltd. *See* Anchor Donaldson Line.

Ellerman and Bucknall Steamship Co., Ltd.; from India and Java (*monthly cargo*).

Furness Line; from Liverpool to St. John's and Halifax (*cargo*); from London to Montreal (*cargo*); from London to Halifax (*cargo*); from London to St. John (*cargo*).

Furness, Withy and Co., Ltd. *See* Furness Line.

Head Line and Lord Line; from Belfast, Cork, Dublin, Hamburg, Londonderry, and Rotterdam to Baltimore, Galveston, Montreal, New Orleans, Quebec, and St. John, N.B. (*chief cargo*).

Houston Lines; from River Plate; from India and Far East (*both cargo services, carrying few passengers*).

Lord Line. *See* Head Line and Lord Line.

Manchester Liners, Ltd.; from Manchester to Quebec (summer), and St. John, N.B. (winter) (*passengers and cargo*).

New York, Newfoundland and Halifax Steam Ship Co., Ltd.; from St. John's, Newfoundland, Halifax, Nova Scotia, and New York (*passengers, mails, and cargo*).

Preston Steam Navigation Co., Ltd.; from East and West Coast Ports of the United Kingdom to Quebec (summer), and St. John, N.B (winter) (*cargo*).

Royal Mail Steam Packet Co.; from Bermuda, West Indies, and Demerara, British Guiana to St. John, N.B., and Halifax, N.S. (*passengers, mails, and cargo*); from Hamburg, Rotterdam, Antwerp, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*).

White Star Line, in conjunction with Dominion Line; from Liverpool to Quebec and Montreal during summer season; and from Liverpool to Halifax and Portland, Me., during winter season (*passengers and cargo*).

China and Japan.

Ben Line Steamers, Ltd.; from Antwerp, Leith, London, and Middlesbrough to the Chief Ports of the Straits Settlements, China, and Japan (*cargo and a few passengers*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from Calcutta to Kobe and Tokyo (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; from Vancouver (*cargo*).

Canadian Pacific Railway Co.; from Vancouver to Yokohama, Kobe, Nagasaki, Shanghai, Manila, and Hong Kong (*passengers and cargo*).

China Navigation Co., Ltd.; between Hong Kong and the Chief Ports of China, Siberia, Japan, Korea, Indo-China, Siam, Straits Settlements, East Indies, and Philippine Islands (*passengers and cargo*).

Cunard Line; from Bristol, Liverpool, London, and Queenstown to Principal Ports of China and Japan (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from New York and Gulf Ports (*fortnightly cargo services*); from United Kingdom and Continent (*monthly cargo services*).

Furness, Withy and Co., Ltd. *See* Prince Line.

Glen Line and Shire Line; from London to Yokohama, calling at Genoa, Port Said, Penang, Port Swettenham, Singapore, Hong Kong, Shanghai, Kobe, and Nagasaki (*passengers and cargo*).

Holt and Co., Alfred.

Java-China-Japan Lijn; from San Francisco to Hong Kong, Makassar, and Cheribon to Batavia (*passengers and cargo*).

Nippon Yusen Kaisha; from Yokohama, *viâ* China, Straits Settlements, Colombo, Suez, and Marseilles to London (*passengers and cargo*).

Peninsular and Oriental Line.

Prince Line; from New York to Straits Settlements, Philippines, China, and Japan (*cargo*).

Rickmers-Linie; from Antwerp and Hamburg to Singapore, Hong Kong, Shanghai, Kobe, Yokohama, and Vladivostock (*freight*).

Shire Line. *See* Glen Line and Shire Line.

Thomson and Co., Wm. *See* Ben Line Steamers, Ltd.

France (Northern), Belgium, etc.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Antwerp, Hamburg, and Havre, calling at Glasgow, Liverpool, and London (*fortnightly cargo services*).

Bennett Line; from Goole and London to Amsterdam, Rotterdam, Calais, Dunkirk, and Hamburg (*cargo*).

Bristol Steam Navigation Co., Ltd.; from Bristol, Plymouth, and Swansea to Calais, Amsterdam, Rotterdam, Antwerp, and Hamburg (*passengers and cargo*).

British Rhineland Navigation and Transport Co., Ltd. *See* Neptune Line.

Brussels Steamship Co., Ltd.; from London to Antwerp (*cargo*).

Burnham Shipping Co., Ltd.; from Cardiff to Antwerp, Rotterdam, and Hamburg (*cargo*).

Burton, Smart and Orford, Ltd. *See* Neptune Line; and Smart's Continental Line.

Compagnie Générale Transatlantique; from Liverpool and London to Calais, Havre, Dunkirk, Rotterdam, Antwerp, and Hamburg (*passengers and cargo*).

Constantine (R. A.) and Donkin, Ltd; from Middlesbrough to Calais, Havre, Antwerp, Rotterdam, and Amsterdam (*passengers and cargo*).

Cork Steam Ship Co., Ltd.; from Liverpool, Manchester, and Southampton to Amsterdam, Rotterdam, Dunkirk, Antwerp, and Ghent; from Glasgow to Antwerp and Ghent; from Belfast to Ghent (*cargo and passengers*).

Cunard Line; from Bristol, Liverpool, London, and Queenstown to Calais, Havre, etc. (*passengers and cargo*).

Dens and Co., Ltd.; from London to Havre (*cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from Australia, Hull, and London.

Ensign Shipping Co., Ltd.; from Hull and London to Amsterdam, Rotterdam, and Hamburg (*cargo*).

Furness, Withy and Co., Ltd.; from Middlesbrough.

General Steam Navigation Co., Ltd.; from East Coast Ports of England to Havre, Calais, Boulogne (*cargo*).
Gibson and Co., Ltd., George; from London to Antwerp, Rotterdam, Amsterdam, and Hamburg (*cargo*).
Great Central Railway; from Grimsby to Calais, Dunkirk, and Havre (*passengers and cargo*).
Great Eastern Railway; from Harwich to Antwerp and Flushing (*passengers and cargo*).
Great Western Railway; from Fishguard and Weymouth to Calais and Havre (*passengers and cargo*).
Harrison, Ltd., John; from London to Havre (*cargo*).
Head Line and Lord Line; Belfast, Cork, Dublin, and Londonderry to Amsterdam, Antwerp, Dunkirk, Hamburg, and Rotterdam (*chiefly cargo*).
Holland Steamship Co., Ltd.; from London and Middlesbrough to principal Dutch Ports (*passengers and cargo*).
Hutchinson, Ltd., J. P.; from East Coast Ports of England to Antwerp, Amsterdam, and Rotterdam (*cargo*).
Kaye, Son and Co., Ltd.; from London to North French Ports (*cargo*).
Lancashire and Yorkshire Railway; from Hull to Dutch Ports (*passengers and cargo*).
Limerick Steamship Co., Ltd.; from Limerick and Cork to Dunkirk, Calais, Havre, Rotterdam, Amsterdam, and Antwerp (*passengers and cargo*).
Lord Line. *See* Head Line and Lord Line.
Marine Mercantile Co., Ltd.; from East Coast Ports of England to Rotterdam, Antwerp, Amsterdam, and Havre (*cargo*).
Neptune Line; from London to Rotterdam, Cologne, and other Rhine Ports (*bi-weekly freight service*); from Hull, Goole, King's Lynn, and other U.K. Ports to Rotterdam, Cologne, and other Rhine Ports (*weekly freight service*).
Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.
Park, Ltd., R. and J.; from London to North French Ports (*cargo*).
Peninsular and Oriental Line; from London to Havre, Calais, Dunkirk, Antwerp, Amsterdam, Rotterdam, and Hamburg (*passengers, mails, and cargo*).
Rankie and Son, James; from London to Dutch Ports (*cargo*).
Royal Mail Steam Packet Co.; from Liverpool and Southampton to French, Spanish, and Portuguese Ports to Madeira, Las Palmas, Teneriffe, St Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*); from London, Hamburg, Antwerp, Hull, and Swansea to Brazil (*passengers, mails, and cargo*); from Hamburg, Antwerp, Rotterdam, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*); from Hamburg, Southampton, and Cherbourg to New York (*passengers, mails, and cargo*).
Smart's Continental Lines; from London to Antwerp, Boulogne, Havre, and Rouen (*bi-weekly freight service*).
Steven and Co., Thos. C.; from Goole to Hamburg (*cargo*).
Walford Lines, Ltd.; from London to Antwerp, Boulogne, Ghent, Dunkirk, Havre, and Honfleur (*cargo*); from Liverpool and Manchester to Antwerp, Rotterdam, and Dunkirk (*cargo*); from Goole (York) to Treport (*cargo*).
Zeeland Steamship Co.; from London and Hull to Rotterdam (*cargo and passengers*).

India, Burmah and Ceylon.
Anchor Line; from Glasgow and Liverpool.
Anderson, Green and Co., Ltd. *See* Orient Line.
Anchor-Brocklebank and Well Lines; from Glasgow, Liverpool, Manchester, and Newport to Bombay and Ceylon (*passengers and cargo*).
Asiatic Steam Navigation Co., Ltd.; from Calcutta to Chittagong and Rangoon; from Calcutta to Rangoon and Moulmein; from Calcutta to Bombay *viâ* Ceylon, calling at Coast Ports; from Calcutta, Rangoon, and Madras to Port Blair (Andaman Islands) (*mails and passengers in all cases*).
Ben Line; from Antwerp, Leith, London, and Middlesbrough to Bombay, Calcutta, Madras, and Rangoon (*passengers and cargo*).
Bibby Line; from Liverpool and London to Bombay, Calcutta, Madras, and Rangoon (*passengers and cargo*).
Blue Funnel Line. *See* Holt and Co., Alfred.
British India Line; from London and Middlesbrough to Calcutta, Bombay, and Madras (*passengers and cargo*).
Canadian Government Merchant Marine, Ltd; from Montreal (*cargo*) (during the winter months from Halifax, N.S.); from Vancouver (*cargo*).
City Line; from Glasgow and Liverpool to Principal Ports of India (*passengers and cargo*).

Clan Line; from Glasgow, Liverpool, and Newport to Calcutta and Madras (*passengers and cargo*).
Cunard Line; from Bristol, Liverpool, London, and Queenstown to Bombay, Madras, Calcutta, and Rangoon (*mails, passengers, and cargo*).
Ellerman and Bucknall Steamship Co., Ltd.; from New York (*weekly cargo services*); from Canada (*monthly cargo services*).
Furness Line; from Antwerp to Bombay (*cargo*).
Hall Line; outward services: from Liverpool to Bombay and Karachi, *viâ* Suez Canal (*passengers and cargo*); from Liverpool to Marmagao and Malabar Coast Ports, calling at Lisbon, Bombay, and for Karachi (*passengers and cargo*): these vessels sometimes load at Newport, Glasgow, and Manchester; and occasionally call at Marseilles and Naples. Homeward services: from Bombay to Marseilles and Liverpool (*passengers and cargo*); from Karachi to Marseilles and Liverpool (*passengers and cargo*); from Madras Coast to Marseilles, London, and Liverpool (*cargo*); from Malabar Coast to Marseilles, London and Liverpool (*cargo*); from Rangoon to Marseilles and Liverpool (*cargo*); from Rangoon to Alexandria and Liverpool (*cargo*); from Colombo to Marseilles, London, and Liverpool (*cargo*).
Harrison Line; from Newport and Swansea to Calcutta (*cargo*).
Henderson and Co.; from Glasgow and Liverpool to Calcutta and Madras (*cargo*).
Holt and Co., Alfred.
Houston Line: from Canada (*cargo services, carrying a few passengers*).
Mogul Steamship Co.; from Birkenhead to Calcutta (*cargo*).
Orient Line; from Tilbury the vessels call at Colombo, Ceylon on their way to Australia, and also on the return voyage (*passengers, cargo, and mails for Commonwealth of Australia*).
Peninsular and Oriental Line; from London.
Turner and Co. *See* Asiatic Steam Navigation Co., Ltd.
Topham, Jones and Railton, Ltd.; from London to Calcutta, Madras, Bombay, and Colombo (*cargo*).

THE MEDITERRANEAN, PORTUGAL, AND SPAIN.

African Steamship Co.; from Liverpool to principal Mediterranean Ports (*passengers and cargo*).
Anchor-Brocklebank Line; from Glasgow and Liverpool to Gibraltar, Tangier, Marseilles, and Angiers (*passengers and cargo*).
Anchor Line; from Glasgow and Liverpool to principal Mediterranean Ports (*passengers and cargo*).
Anderson, Green and Co., Ltd. *See* Orient Line.
Armstrong, Lord and Co.; from Ports on East Coast of United Kingdom to principal Mediterranean Ports (*cargo*).
"Artus" Line. *See* Hugo Stinnes Linie.
Bibby Line; from Liverpool and London to principal Mediterranean Ports (*passengers and cargo*).
Bland Line; from the United Kingdom to the Near East and Black Sea, calling at Alicante, Valencia, and other Mediterranean Ports (*monthly passenger and cargo services*); from the United Kingdom to Ceuta, Tetuan, Melilla, Larache, Rabat, and Kenitra (*passengers and cargo*); between Casablanca, Tangier, Gibraltar, Oran, Algiers, and Alicante (*passengers, mails, and cargo*).
British India Line; from London and Middlesbrough to principal Mediterranean Ports (*passengers and cargo*).
Burnham Shipping Co., Ltd.; from Cardiff to Marseilles, Angiers, Tangier, and Gibraltar (*passengers and cargo*).
Compagnie des Messageries Maritimes; from Port St. Louis to Marseilles, Bizerta, Alexandria, Port Said, Beyrouth, Tripoli, Caiffa, and Jaffa (*cargo*).
Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Havre, Dunkirk, and Rouen to Algeria (*passengers and cargo*).
Compañia Transatlantica (Royal Mail Line of Steamers); from Liverpool to Barcelona, Cadiz, Corunna, Cartagena, Lisbon, Azores, and Vigo (*passenger, freight, and mails*).
Compañia Transmediterránea; from Cadiz to Canary Islands; from Algeciras to Ceuta; from Algeciras and Cadiz to Tangier (*passengers, cargo and mails*).
Davies Steamship Co., W. R.
Dens and Co., Ltd.; from Newcastle-on-Tyne to principal Mediterranean Ports.
Dickinson and Co., Ltd., William; from the Tyne to principal Mediterranean Ports (*cargo*).
Ellerman and Bucknall Steamship Co., Ltd.; from New York (*three-weekly cargo services*).
Ellerman Lines; from Liverpool to Gibraltar, Algiers, Malta, Alexandria, Genoa, Leghorn, Naples, Palermo, Messina, Catania, Bari, Ancona, Venice, Trieste,

Fiume, Patras, Piræus, Syra, Volo, Salonica, Smyrna, Constantinople, Lisbon, and Oporto (*passengers and cargo*).
Ellerman's Wilson Line; from Hull to Tangier and Algiers (*passengers and cargo*).
Furness Line; from New York to Piræus, Patras, Salonica, Constantinople, Bulgarian and Danube Ports, Smyrna and Alexandria (*cargo*).
Furness, Withy and Co., Ltd. *See* Furness Line, Johnson Line, and Prince Line.
General Steam Navigation Co., Ltd.; from London to Tangier (*cargo*).
Glen Line and Shire Line; from London to Yokohama, calling, at Genoa and Port Said (*passengers and cargo*).
Glynn and Co., Ltd.; from Liverpool to principal Mediterranean Ports (*cargo*).
Golden Cross Line; from Bristol, Cardiff, Liverpool, and Swansea to principal Mediterranean Ports (*cargo*).
Hall Line; from Glasgow and Liverpool to Aden, Mombasa, Kilnidini, Zanzibar, and ports of Madagascar and Portuguese East Africa, calling at Lisbon, Port Said, and Port Ludan (*cargo*); Beira and other East African Ports to Marseilles and Liverpool (*cargo*); Aden to Marseilles and Liverpool (*cargo*); Port Ludan to Marseilles and Liverpool (*cargo*).
Hogarth and Sons; from Glasgow to principal Mediterranean Ports (*cargo*).
Hugo Stinnes Linien; from Hamburg to Portuguese Ports, Pernambuco, Montevideo, Buenos Aires, and Rosario (in association with the "Artus" Line, Danzig) (*passengers and cargo*).
Johnson Line, Ltd.; from Liverpool, Swansea, and Antwerp to Piræus, Syra, Smyrna, Volo, Salonica, Constantinople, Bougas, Varna, Constanza, Sulina, Tulcea, Galatz, and Baila (*cargo*).
Koninklijke Hollandsche Lloyd; from Antwerp to Buenos Aires, calling en route at Southampton, Cherbourg, La Corma, Vigo, Leixoes, Lisbon, Las Palmas, Pernambuco, Bahia, Rio de Janeiro, Santos, and Monte Video (*passengers, mails, and cargo*).
McAndrews and Co., Ltd.; from London, Liverpool, Glasgow, Hull, Swansea, Antwerp, and Hamburg to Lisbon, Gibraltar and the Principal Ports of Spain (*cargo and a few passengers*).
Moss Line; from Liverpool, Glasgow, and Swansea to Alexandria, calling at Gibraltar, Algiers, and Malta; from Liverpool, Glasgow, and Swansea to Constantinople, calling at Gibraltar, Oran, Malta, Syra, Smyrna, Salonica, and Volo; from Liverpool, Glasgow, and Swansea to Beyrouth, calling at Casablanca, Malta, Famagusta, Sarnaca, Alexandretta, Haifa, Jaffa, and Port Said; from Liverpool, Glasgow, and Swansea to Bordeaux; from Liverpool, Glasgow, and Swansea to Casablanca and all Moroccan Ports (*all cargo services*).
Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.
Orient Line; from Tilbury to Colombo, Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Toulon, Naples, and Port Said. On the homeward voyage the vessels call at Plymouth (*passengers, cargo, and mails for Commonwealth of Australia*).
Papayanni Line; from Liverpool to principal Mediterranean Ports (*passengers and cargo*).
Power and Co., J.; from London to principal Mediterranean Ports (*cargo*).
Prince Line, Ltd.; from Leith, London, Middlesbrough, Antwerp, and the Tyne to Tunis, Malta, Alexandria, Syra, Cyprus, and Levant (*cargo*).
Rotterdam-Zuid-Amerika Lijn; from Antwerp, Rotterdam, and Hamburg to Buenos Aires, Monte Video, Santos, Rio de Janeiro, Bahia, and Pernambuco, calling at Bilbao, Santandar, and Vigo (*cargo, carrying a few passengers*).
Royal Mail Steam Packet Co., from London to Lisbon (*cargo only*); from Swansea to Lisbon and Algave Ports (*cargo only*); from London to Madeira, Las Palmas (*passengers, mails, and cargo*); from Southampton and Liverpool to French, Spanish, and Portuguese Ports, Las Palmas, Teneriffe, St. Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*).
Salvesen and Co., J. T.; from Grangemouth to Spanish Ports and Marseilles (*cargo*).
Shire Line. *See* Glen Line.
Sloman (Rob. M. Jun.) Mittelmeer-Linie; from Hamburg to Spain and Chief Mediterranean Ports (*passengers and cargo*).
Sota y Aznar; from Glasgow and Liverpool to Spanish Ports (*cargo*).
Stinnes Linien. *See* Hugo Stinnes Linien.
Strick and Co., Ltd., Frank C.; from Antwerp, London, Glasgow, and Manchester to Port Said, Aden, Bandar Abbas, Bushire, Mohammarah, Basrah, Ahway, and Bagdad (*cargo, also passengers in certain ships*).
Union-Castle Line; from London and Southampton to Canary Islands, Teneriffe, Madeira, Gibraltar, and Port Said through the Suez Canal, calling at Aden,

Zanzibar, and Mombasa to Cape Town and all South African Ports and *vice versa* (*passenger, mails, and freights*).
Westcott and Lawrence Line; from Liverpool to principal Mediterranean Ports (*cargo*).
White Star Line; from New York and Boston to Genoa, calling at Azores, Gibraltar, and Naples (*passengers and cargo*).
Yeoward Line; from Liverpool to Mediterranean ports (*cargo*).

Straits Settlements and East Indies.
Asiatic Steam Navigation Co., Ltd.; from Indian Ports to Principal Ports of Java (*mails and passengers*).
Ben Line Steamers, Ltd.; from Antwerp, Leith, London, and Middlesbrough to Chief Ports of Straits Settlements, China, and Japan (*cargo and a few passengers*).
Blue Funnel Line. *See* Holt and Co., Alfred.
British India Line; from Calcutta to Singapore (*mails, passengers, and cargo*).
Compañia Transatlantica; from Liverpool to Singapore, Philippines, Manila, Ilvilo, Cebu, Cavite, and Zamboanga (*passengers, mails, and freight*).
China Navigation Co.. Ltd; between Hong Kong and the Chief Ports of China, Siberia, Japan, Korea, Indo-China, Siam, Straits Settlements, East Indies, and Philippine Islands (*passengers and cargo*).
Commonwealth Government Line of Steamers; from all Australian Ports to Java and Singapore (*cargo*).
Cunard Line; from Bristol, Liverpool, London, and Queenstown.
Ellerman and Bucknall Steamship Co., Ltd.; from New York and Gulf Ports (*fortnightly cargo service*); from United Kingdom and Continent (*monthly cargo service*); from Canada to Java (*monthly cargo service*).
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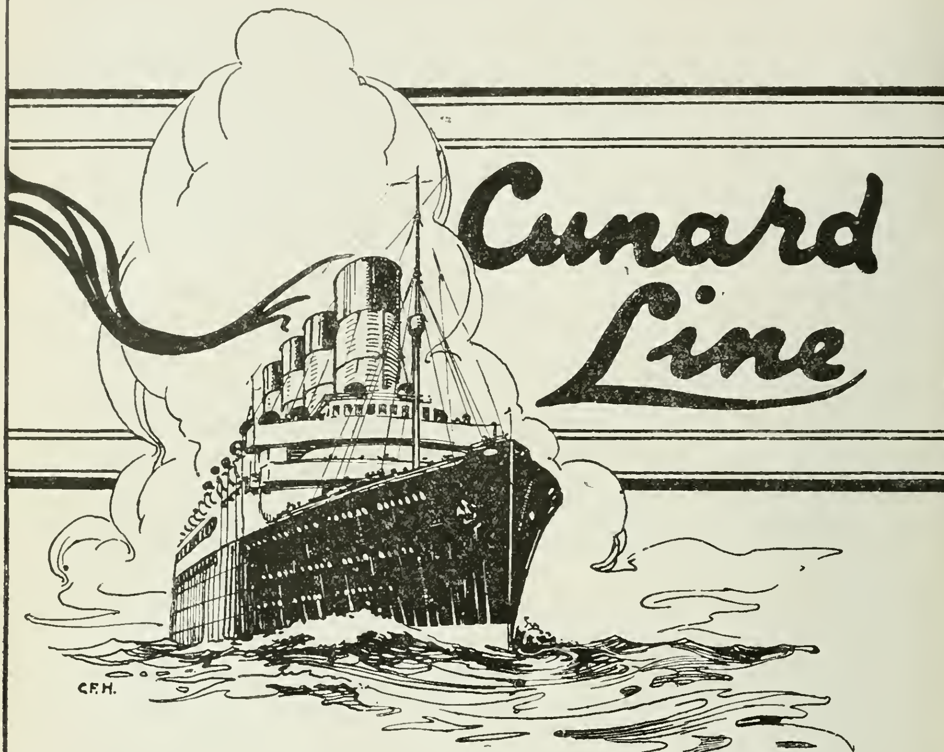

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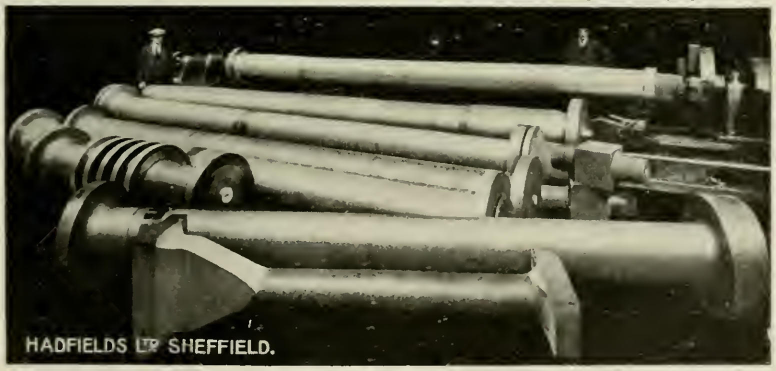

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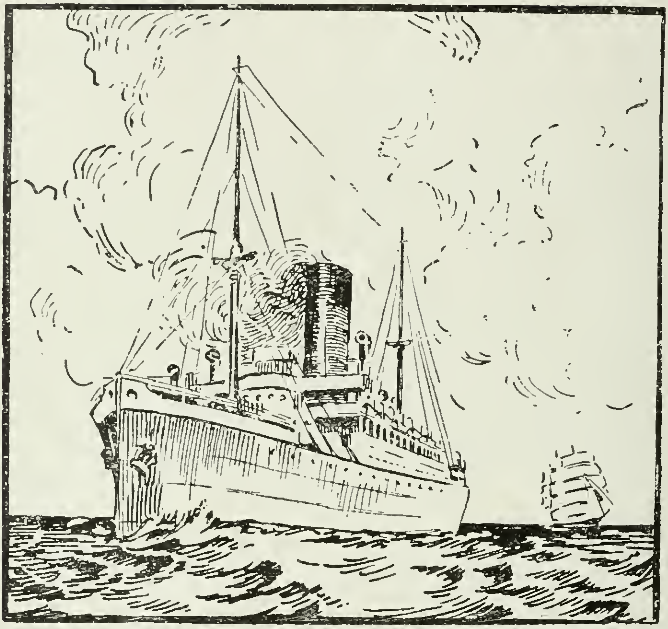

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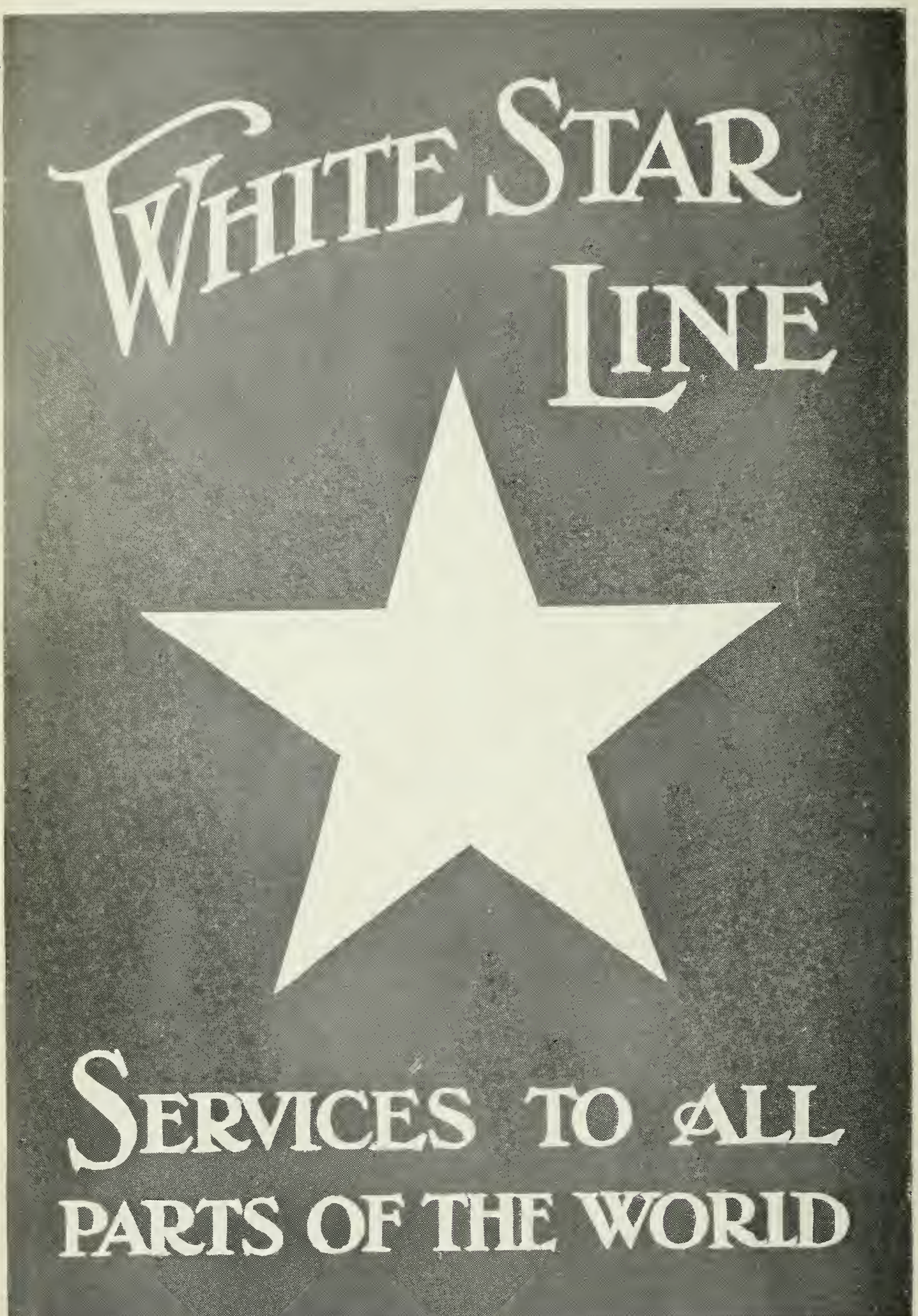
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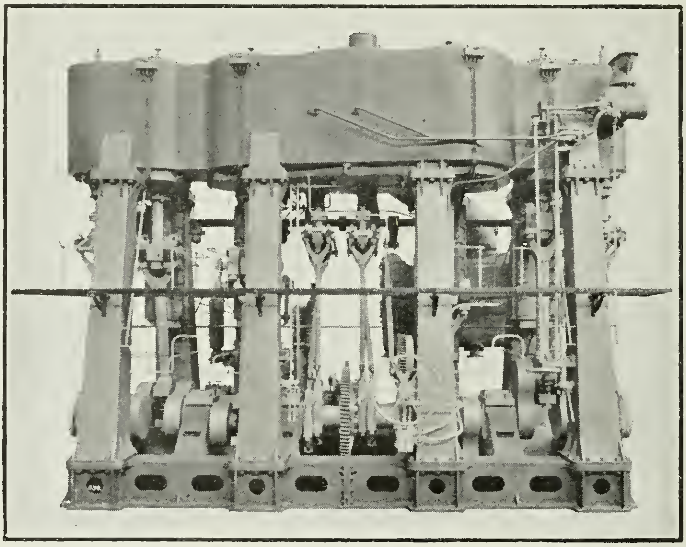

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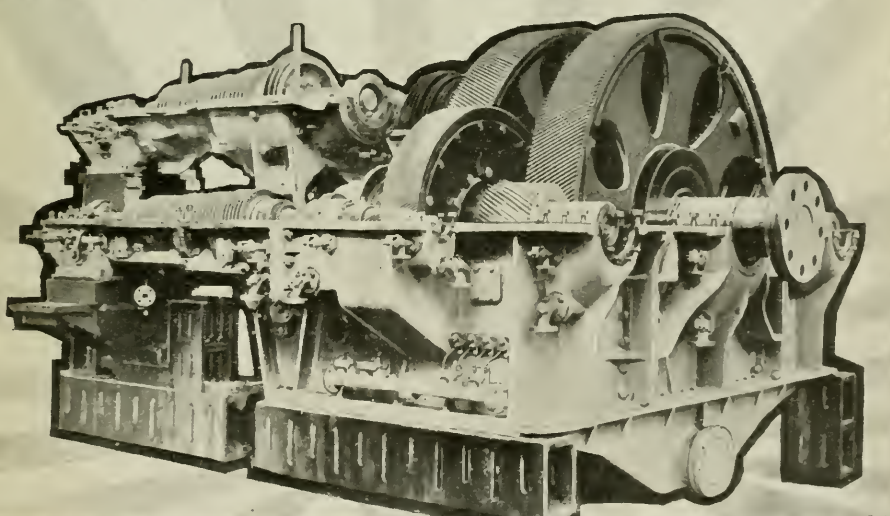

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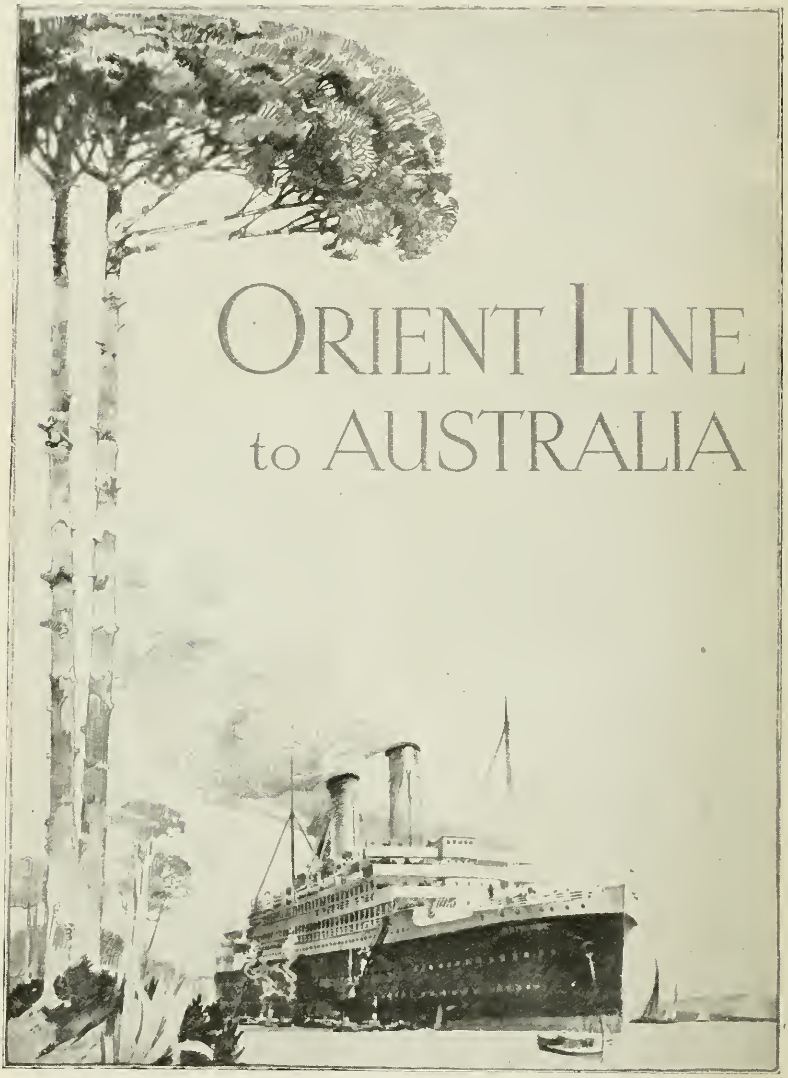

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